MECHANICS' MAGAZINE,

AND

REGISTER OF INVENTIONS AND IMPROVEMENTS.

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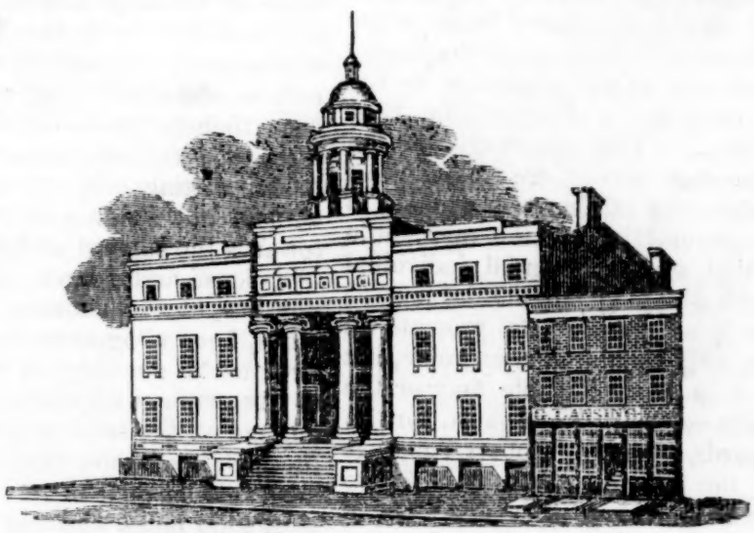
The caprices of Nature yield us a useful lesson! How inexcusable are those who have neither an ear nor an eye for its constant admonitions,—who suffer the most extensive and the only gratuitous *library of useful knowledge* to remain unread! Shall I venture to call it that splendid annual, published by its Mighty Author for nearly six thousand years, every page of which furnished an inimitable picture of human life, and every line of which presents us an idea and a moral.—FLORA BRUMAL.



MERCHANTS' EXCHANGE, NEW-YORK.

This building is situated on the south-west side of Wall street, on the corner of Hanover street, extending through to Exchange Place, having a front of about 125 feet in Wall street, and forming nearly a square. The basement story is occupied principally by the Post Office. On the principal story is the Exchange Room, which is 100 feet in length and 60 feet in width, with an arched ceiling suspended from the rafters of the building. It is constantly kept well lighted, warmed, and ventilated, and is attended by a person competent to give such information as strangers may require. The other parts of the building comprise the Stock Exchange, and various other offices devoted to mercantile pursuits, which are always in request.

In the dome is the Exchange Telegraph, connected with several stations in the harbor, the most remote of which is on the Highlands of Neversink, in the State of New-Jersey, the distance of which, in *a direct line*, is about 27 miles. This station is situated upwards of 400 feet above the level of the sea, and in clear weather commands a prospect of the offing, upwards of 30 miles in extent. The means of communication by the Telegraph are so easy, that any information can be conveyed through the whole line in less than five minutes.

In addition to the station on Staten Island, the proprietors have placed signal poles, which always show, during the day, the number of inward bound vessels in sight, and they form a guide for pilots, by whom they can be seen from the principal wharves in the city. These stations have been erected at great expense by the Company.

In the Exchange Room is a book, open to the public, in which the Telegraphic communications are entered immediately they are received.

Ballingall's Improvements in Ship-Building.

[From the London Mechanics' Magazine.]

It is now upwards of twenty years since Sir Robert Seppings introduced into the Royal Navy various improvements in ship-building, which are universally allowed to have imparted great additional strength, safety, and durability, to our ships of war: yet, to use the words of Mr. Knowles, (*Inquiry into the Means which have been taken to preserve the British Navy,*) such is "the jealousy incident to human nature, in properly appreciating and applying the inventions of others, or the indolence of the mind in not bringing itself to examine new methods or combinations—these improvements, while they have been eagerly grasped by foreign nations, are but slowly introduced in the ships of our merchants, and, with an apathy hardly to be credited, are totally neglected by the first trading company in Europe (the East India Company)." The advantages of the improved system, however, are so manifest and indisputable, that all that was wanting to bring it into general use, in the mercantile navy, was, that some influential individual connected with shipping should take it up—should make it his business to promote its adoption, not only by his own example, but by pressing it in every possible way on the public attention—should do, in short, for the merchants' yards, what Sir Robert Seppings has done for the King's. We are happy to say that such an individual has at length been found in Mr. Ballingall, the author of a very clever and intelligent work, which we have now before us, entitled "The Mercantile Navy Improved."* Mr. Ballingall has brought to the task he has undertaken, not only all the weight of an official situation of considerable prominence, but great practical experience, combined with what seldom accompanies it in men of his class, a very earnest and clear-sighted desire of improvement. He candidly acknowledges that "the greater part" of the alterations in construction which he proposes to have adopted in merchant ships, are already "in practice in the Royal Navy;" but he has at the same time enhanced the utility of these alterations by so many new suggestions, and added so many valuable contrivances, entirely his own, that he has a fair claim to be considered as himself an improver of the first order.

We cannot undertake to give within the limits to which we must needs confine ourselves, the whole details of Mr. Ballingall's system; but we shall endeavor to place in a distinct point of view before our readers, two or three of its more important features.

1. *The filling in of the timbers*—that is, bringing the ribs or frames into one compact body up to the gunwale—claims, on account of the immense consequences dependent upon it, the first place in our consideration. A ship is but an arch of peculiar adaptation, and the strength of every arch is in proportion to the mutual dependance of the parts on each other; but, according to the ordinary mode of building merchant ships, not more than one-half the timbers have such a mutual dependance. Every alternate couple of ribs only is connected together, and the intermediate timbers (absurdly enough termed *fillings*) are entirely unconnected with each other, resting only on the outer planking, without contributing, in the smallest degree, towards the support of the general structure. This loose and dangerous mode of construction has, at the instance of Sir Robert Seppings, been altogether abandoned in the construction of our ships of war. Every couple of ribs, without exception, is closely connected, and all the smaller interstices, as high as the floor heads, are filled in and caulked; in short, the bottom is converted into one compact solid mass, and that wholly exclusive of the outer planking. It must be evident that a ship thus constructed may sustain very considerable damage in her outer planking—lose actually a plank or two, or even her keel—and yet reach the place of her destination; while the loss of even a portion of a single plank or of the keel would be the destruction of a vessel built on the present mode. When water gets once past the outside planking of any ordinary vessel, nothing but the pumps can save it; and should these get choked, or the crew become exhausted in working them, (both very common cases,) down she must go. From numerous illustrative instances adduced by Mr. Ballingall, of the advantage which ships of war possess over merchant vessels in this respect, we quote the following:

"On or about the same ledge of rocks on which the Wolf, sloop of war, struck, and lay fast for two nights and a day, in March, 1830, at the back of the Isle of Wight, the vessel at the time she struck going at a con-

* The Mercantile Navy Improved; or a Plan for the Greater Safety of Lives and Property in Steam Vessels, Packets, Smacks, and Yachts, with Explanatory Drawings. By James Ballingall, Manager of the Kirkaldy and London Shipping Company, and Surveyor of Shipping for the Port of Kirkaldy, 1832. Morrison, London.

siderable rate through the water, at the very top of high water of a high spring tide, and with a considerable swell on, and which vessel was got off again and is now in the East Indies, having been dragged over the rocks for half a mile by assistance from Spithead, the vessel beating very hard upon the rocks with the lift of the sea all the time, the Carn Brea Castle, free trader to India, was lost only a few months before, having got ashore under more favorable circumstances for getting off again. What could this be owing to? The ships were nearly, I believe, of similar tonnage. The answer is plain and obvious. The Wolf had a solid bottom of 15 inches thick at the keel, being 12 inches of timbers, and three inches of outside plank, without allowing her to have had any ceiling. The Carn Brea Castle would only have an outside bottom plank to protect her, of, I presume, 3 inches thick. Yet this vessel would have timbers of 12 inches thick, if no more, and a ceiling plank of, I also presnme, 3 inches thick, making 3 inches more than the sloop of war, but neither of which were of the least use to her in keeping out the water. Had her timbers been close and her ceiling been caulked, she would have had one more protection than the sloop of war, viz. the ceiling plank, without taking any thing from her stowage, and the fair inference is that she would have been got off and preserved."—P. 97–99.

Mr. Knowles, in a letter to Mr. Ballingall, dated "Navy-Office, October 24, 1831," states that "the whole navy proves that the ships with solid bottoms have been more durable than they used to be when openings were left;" and he particularly specifies the case of the Success, which went ashore in Cockburn Sound, when "the whole keel was carried away, also the lower piece of stern, five feet four inches of the stern-post, four pieces of the dead wood, nine strakes of the bottom, amidships, and many strakes in the bows, and yet this ship was floated off."

Sir Robert Seppings has justly the credit of introducing this practice into general use in the Royal Dock Yards; but when in office, he had himself the liberality to point out to Mr. Ballingall, in the model-room at the Navy-Office, the model of a brig called The Lady Nelson, which was built about 1790, under the directions of Admiral Schanks, on the principle of a perfect union of the timbers, and is now, after a lapse of thirty-two years, still running, and "tight as a bottle."

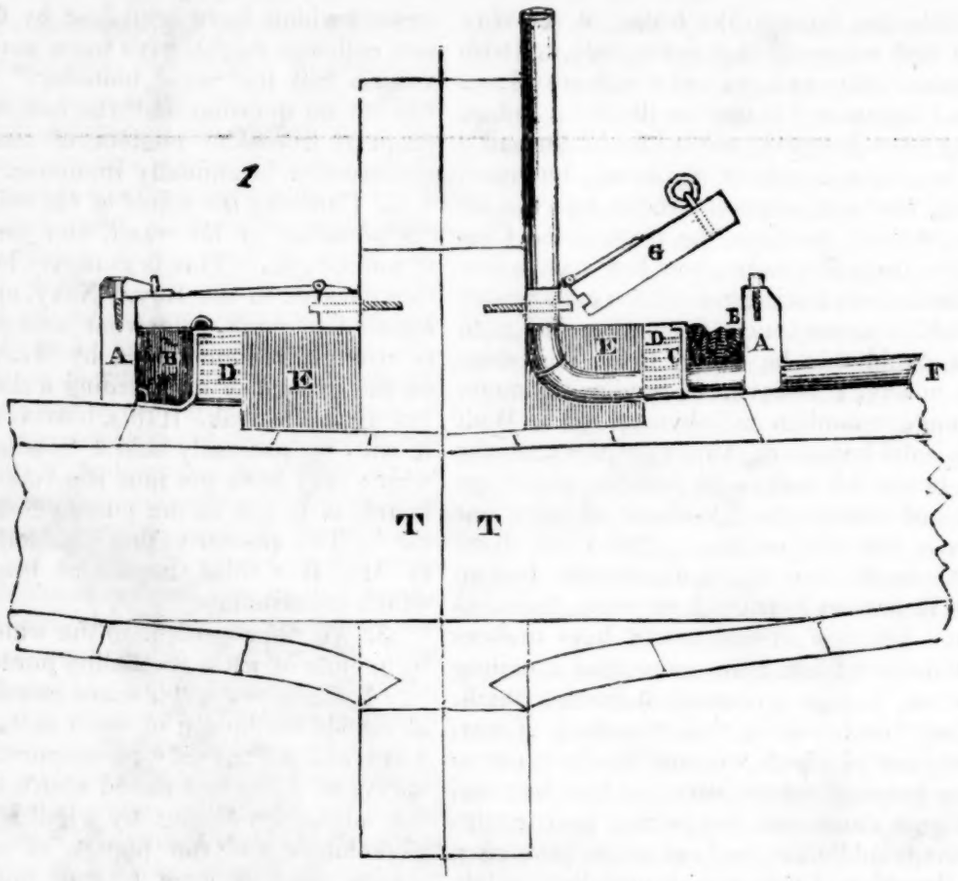
Mr. Ballingall thinks that "nearly all the vessels which have been lost by foundering and collision might have been saved, if the vessels had had solid bottoms;" and there can be no question that the loss of life and property from the neglect of this mode of construction is annually immense.

2. *Caulking the whole of the ceiling or inner planking of the vessel*, and thus making it water-tight. This is contrary to the practice pursued in the Royal Navy, and, we are induced to think, somewhat superfluous, but is strongly recommended by Mr. Ballingall, on the ground of its affording a double security against a leak. If this, however, be done, it will be naturally asked how any water, which may have got into the vessel from inboard, is to get to the pumps to be pumped out? The answer to this question brings us to Mr. B.'s third important improvement, which consists in

3. An improvement in the water-courses, by means of what are called percolators:

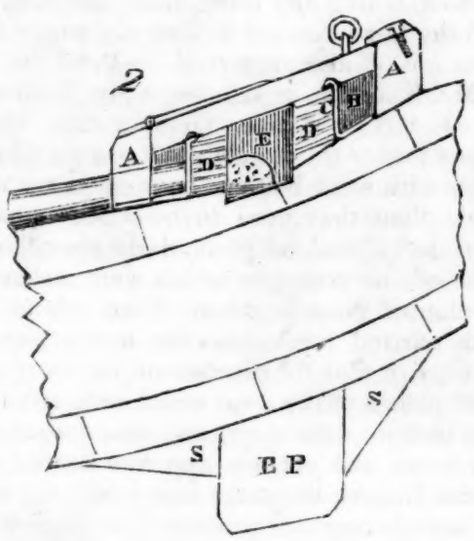
"I would propose a water-course to be led alongside the kelson on each side, as far forward and aft as may be required from the spring of the vessel raised above the level of the adjoining ceiling, by what I would call percolators, and the bottom of said water-course sunk at least an inch and a half or more below the level of the adjoining ceiling, to allow any water which might get into the vessel to drain off the ceiling into this water-course. There should be a gradual acclivity forward and aft, to cause the water to flow readily along the water-courses to the bottom of the pumps. This would be greatly assisted by the spring of the vessel. In men of war, East and West India ships, and, in general, in all vessels which either carry no cargoes, or their cargoes in packages, these percolators may be readily made of strong and thick oak battens, fastened to the ceiling close to the water-courses, and raised, say from 6 or 8 inches high, above the ceiling, with notches cut in the under edges or sides of them, similar to, I believe, the practice in the navy. These water-courses to be covered with limber boards, as at present, and the boards would not be required to be tight on the top; the boards to be sloped up to the kelson."—P. 20.

Mr. Ballingall does not propose these percolators simply because they obviate the objection before stated to the caulking of the ceiling, but for this further reason, that, whether the ceiling is caulked or not, they furnish a better means of conveying the water to the pumps, and keeping the pumps clear

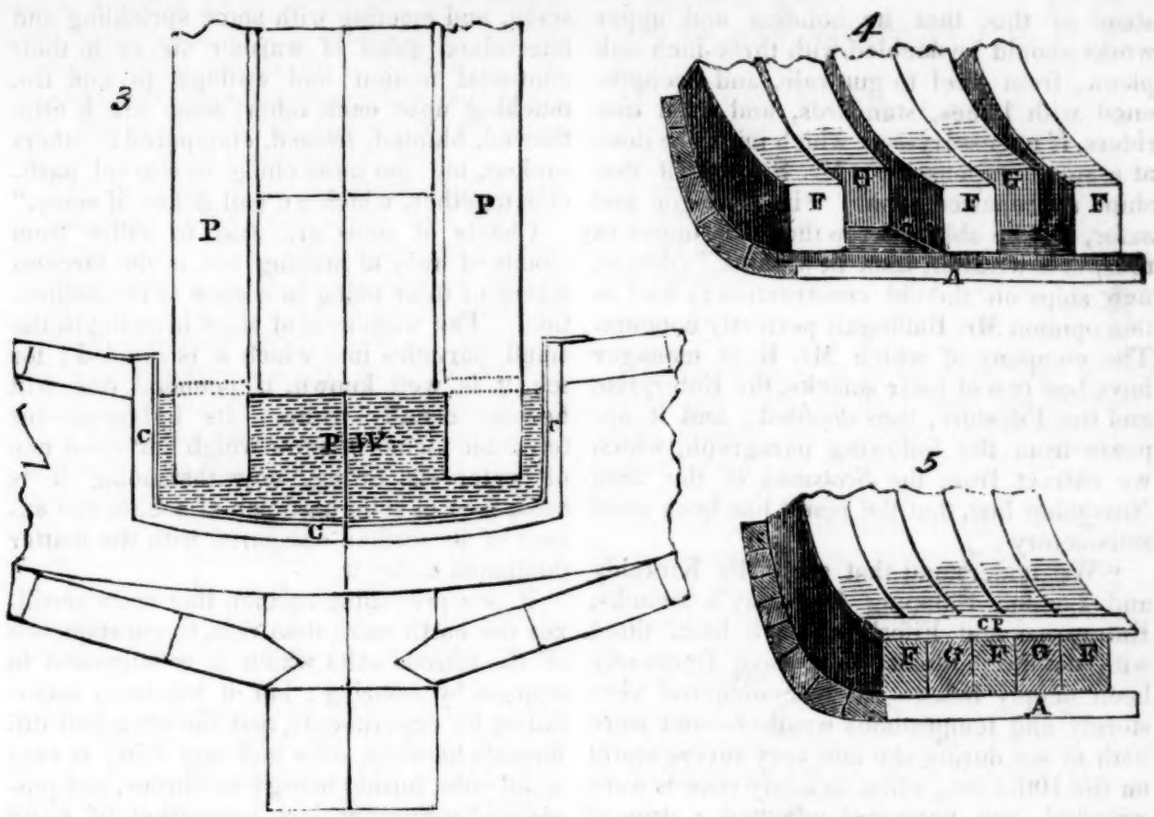


than any now in use, while at the same time they contribute considerable additional stability to the vessel. The explanations on this head are too long for quotation, but are to our minds entirely satisfactory.

The better to elucidate these different improvements, we copy from Mr. Ballingall's book the accompanying illustrative sketches. Fig. 1 is part of a transverse section of a ship built on Mr. Ballingall's plan, and fig. 2 a continuation of that section (part broken off.) TT is the compact floor, with its bottom and ceiling planking. AA are guards fitted to protect the percolators from damage by shovels, &c. in taking out ballast or unloading a cargo. BB spaces filled with tanner's bark, charcoal, &c. or such substances as will allow the water to flow freely through them, and keep back sand, and so prevent the copper strainers, on the outer edge of the percolators, from being choked. CC the copper strainers (shown by double lines) on the outer edge of the percolators. DD the percolators, the lid or covering being open on the starboard side in midships, and shut on the larboard side and at the bilge receiver. EE limbers or receivers for water. FF the pipe which leads from the water-course down into the well prepared for it at the



bilge. G shows the top of one of the main percolators opened; that on the other side is represented as shut. BP is the bilge piece. SS the water-courses, serving as supporters to the bilge piece. Fig. 3 is another transverse section, showing the alterations necessary to be made in the positions of the pump (P), pump-well (PW), and cistern (CC), in order to suit the new system. Fig. 4 is part of a longitudinal section of a merchant ves-



sel, cut off at a line perpendicular to the outside of the keel. F is the floor, G the futtocks. It will be seen from this, that the outside planking is reduced at the garboard strake, A, to one-half the general thickness, by the rebate for the water-course; so that, supposing the general thickness to be, as usual, 3 inches, only one inch and a half is left between the inside of the ship and the element on which she floats. Fig. 5 exhibits, in section, the same part of a vessel, as constructed on Mr. Ballingall's plan. Here the floors, futtocks, or cross pieces (G,) planks of the bottom (A), and ceiling plank (CP), form one complete mass, and present a substance of 18½ inches, (instead of 1½!) to withstand all accidents.

Among the subordinate advantages attending this improved system of ship-building, there are two which are particularly deserving of notice: one is the greater security from fire which it affords, in consequence of all the vacancies, which at present act as so many funnels to the flames, being filled up; and the other, the protection obtained from vermin, in consequence of there being no harbor left for them between the timbers and the inside and outside planks.

Various objections to the system will naturally suggest themselves to the minds of practical men; it is certain, also, that the improvements which it embraces are not equally applicable to all merchant ships: but before any ship-builder or ship-owner rejects it on either account, we would earnestly advise him to send for Mr. Ballingall's book, where he will find nearly every possible objection very frankly discussed, and every modification, which particular circumstances may call for, provided for with great intelligence and ability.

We perceive, from a letter which Mr. B. has published, from Messrs. Ogilvie & Crichton, of Leith, the builders of the Royal Adelaide, steam ship, (one of those which ply between London and Edinburgh,) that she has been built, "in most respects, on the plan now recommended," and that it is the intention of the company to which it belongs to adhere to that plan "in any vessels which they may hereafter build." We trust that so judicious and spirited an example will not be long without numerous imitators.

Mr. B.'s book contains, also, instructions for rendering vessels, already built on the present plan, more secure at a cheap rate. He particularly recommends a revival of the plan of placing a doubling on ships, as was proposed as far back as 1792, by Mr. Snodgrass, surveyor of shipping to the East India Company. Mr. S.'s plan was, "that no ship should have a thorough repair; but in-

stead of this, that its bottoms and upper works should be doubled with three-inch oak plank, from keel to gunwale, and strengthened with knees, standards, and even iron riders, if necessary—all which might be done at a small expense." Mr. S. thought that ships so repaired would "be stronger and safer, and be able to keep the seas longer in the worst weather, than new ships," (that is, new ships on the old construction;) and in this opinion Mr. Ballingall perfectly concurs. The company of which Mr. B. is manager have had two of their smacks, the Enterprise and the Fifeshire, thus doubled; and it appears from the following paragraph, which we extract from the *Scotsman* of the 28th November last, that the result has been most satisfactory:

"We understand that since the Kirkaldy and London Shipping Company's smacks, Enterprise and Fifeshire, have been fitted with double bottoms, they have frequently been deeply laden—have encountered very stormy and tempestuous weather—and were both at sea during the late very severe storm on the 10th curt., when so many vessels were wrecked, and have not admitted a drop of water through their bottoms or sides."

Nature and Formation of Snow.—If snow is carefully examined with an eye-glass immediately after it reaches the ground, it will be found to consist, for the most part, of a regular figure of transparent ice, in the form of a star of six points. On each of these points, if minutely inspected, will be seen other collateral points, having the same angles of those of the main star. Next to this figure is a single shoot often seen, resembling a small slender cylinder. Besides these two regular figures, which are the principal ones, we discover various broken points and fragments, occasioned, probably, by the wind in their descent, and by being thawed and frozen again into irregular forms.

"From hence the true notion and external nature of snow seems to appear, viz.: that not only some few parts of snow, but originally the whole body of it, or of a snowy cloud, is an infinite mass of icicles regularly figured; that is, a cloud of vapors being gathered into drops, the said drops forthwith descend: on which descent, meeting with a soft freezing wind, or at least passing through a colder region of air, each drop is immediately frozen into an icicle, shooting itself forth into several points on each hand outward its centre; but still continuing their descent, and meeting with some sprinkling and intermixed gales of warmer air, or in their continual motion and waftage to and fro, touching upon each other, some are a little thawed, blunted, frosted, clumpered; others broken, but the most clung in several particles together, which we call flakes of snow."

Clouds of snow are said to differ from clouds of rain in nothing but in the circumstance of their being in a state of crystallization. The whiteness of snow is owing to the small particles into which it is divided; for ice, it is well known, if pounded fine, will become equally white. Its lightness—for ten cubic inches of snow weigh but about one of water—is owing, notwithstanding it is composed of solid particles of ice, to the excess of its surface compared with the matter contained under it.

It is a prevailing opinion that snow fertilizes the earth more than rain, in consequence of the nitrous salts which it is supposed to acquire by freezing; but it has been ascertained by experiments, that the chemical difference between snow and rain water is very small—the former being less nitrous, and possessing somewhat less proportion of earth than the latter. Neither of them, however, it is believed, contain earth or salts of any kind of sufficient quantity to be sensibly efficacious in promoting vegetation. That snow promotes vegetation, by keeping the earth warm, there can be no doubt. The internal parts of the earth are heated uniformly, it is said, to the forty-eighth degree of Fahrenheit. The cold atmosphere of the winter months, were the surface of the earth exposed to its influence, would reduce the temperature to that degree of cold by which the roots of vegetables would be seriously injured, if not destroyed. "Providence has, therefore, in the coldest climates, provided a covering of snow for the roots of vegetables, by which they are protected from the influence of atmospheric cold. The snow keeps in the internal heat of the earth, which surrounds the roots of vegetables, and defends them from the cold of the atmosphere."—[Family Lyceum.]

To Mechanics.—Of all the pursuits of life, none more certainly insures comfort and respectability than that of a mechanic. The farmer may lose his crops by unfavorable seasons; the merchant is subject to innumerable vicissitudes; and the professional man is often compelled to struggle for years, unnoticed and unrewarded. But the man who under-

stands a useful trade, if blessed with health, need never want food, or clothing, or shelter, provided he be industrious and prudent. So well have the Jews understood this, that every Jew, whatever his rank, has in all ages been required to learn some useful trade.

Why is it, then, that so many skilful men of this class have never more than the bare necessaries of life; their families scantily supplied with food; nothing laid up against a sick day; and when death comes, perhaps a wife and children left destitute and helpless? The simple reason, in nine cases out of ten, is this: they indulge in the *useless, pernicious, wasting, destroying* practice of drinking spirits! *Useless*, as is proved by the testimony of medical men, and all who abstain from it; *pernicious*, from its invariable effects on the health, disposition, and morals; *wasting*, for it leads most generally to poverty and want; *destroying*, for respectability, property, body and soul, fall a sacrifice before it.

Total abstinence from *strong drink* is the best insurance against the world's ills, that has yet been discovered. The strictly temperate man has a clear head, a steady hand, a good appetite; his temper is under his control; he saves time; he saves money; he is respectable, whatever be his station in society. But the man who drinks but *a little* is in the high road to ruin. Of the vast multitudes of our race who have lived the drunkard's life, and filled the drunkard's grave, and entered upon the drunkard's eternity, the beginning of their downward course was *drinking a little.*

The saving of the money usually expended for spirits, without estimating any other advantages that arise from total abstinence, will, in a few years, produce a handsome competency.

Should a mechanic read this, who is 40 years of age, and who has expended 12½ cents a day for spirits, who is feeling the bitterness of poverty, by saving this sum, he might, since he was 21 years of age, have accumulated about 1,000 dollars—if he is 50 years of age, 1,500 dollars—60 years of age, 2,000 dollars—and 25 cents a day would produce twice the above amounts.

Is there a mechanic who finds it difficult to provide food, and raiment, and other comforts of life for his family, but who is in the daily practice of expending 12½ cents a day for spirits? This small sum of 12½ cents a day will, in one year, purchase the following necessaries of life, viz.:

1 barrel of flour, . .	$5 00
100 lbs. pork, and 100 lbs. beef,	10 00
Cloth for coat, . . .	6 00
Cloth for pantaloons, . .	3 00
8 cotton shirts, . . .	4 00
4 loads wood, . . .	8 00
3 pairs shoes, . . .	4 50
1 calico frock, . . .	1 25
1 bombazet do. . . .	2 00
6 yards flannel, . . .	1 88
	$45 63

These articles, in addition to what he has before felt able to purchase, will probably make himself and family comfortable; and if they "add to temperance virtue," they may be useful and happy.

Should any individual, whether employer, journeyman, or apprentice, determine, after perusing the above, to adopt the principle of *total abstinence* from ardent spirits, it is hoped he will not stop there, but will give the whole weight of his influence, by uniting with the Temperance Society, and urge on all his companions and acquaintances to do so likewise.—[Temperance Recorder.]

Knowledge. *By Rev. L. Whitington.*—There is a close connection between ignorance and vice; and in such a country as our own, the connection is fatal to freedom. Knowledge opens sources of pleasure which the ignorant man can never know—the pursuit of it fills every idle hour, opens to the mind a constant source of occupation, wakes up the slumbering powers, and unveils to our astonishment ideal worlds; secures us from temptation and sensuality; and exalts us in the scale of rational beings. When I pass by the grog-shop, and hear the idle dispute and obscene song; when I see the cart rolled along filled with intoxicated youth, singing and shouting as they go; when I discover the boat sailing down the river, where you can hear the influence of rum by the noise which it makes, I cannot but ask—Were these people taught to read? Was there no social library to which they could have access? Did they never know the calm satisfaction of taking an improved volume by a peaceful fire-side? Or did they ever taste the luxury of improving the mind? You hardly ever knew the young man who loved his home and his book, that was vicious. Knowledge is often the poor man's wealth. It is a treasure no thief can steal, no moth nor rust can corrupt. By it you turn his cottage to a palace, and you give a treasure

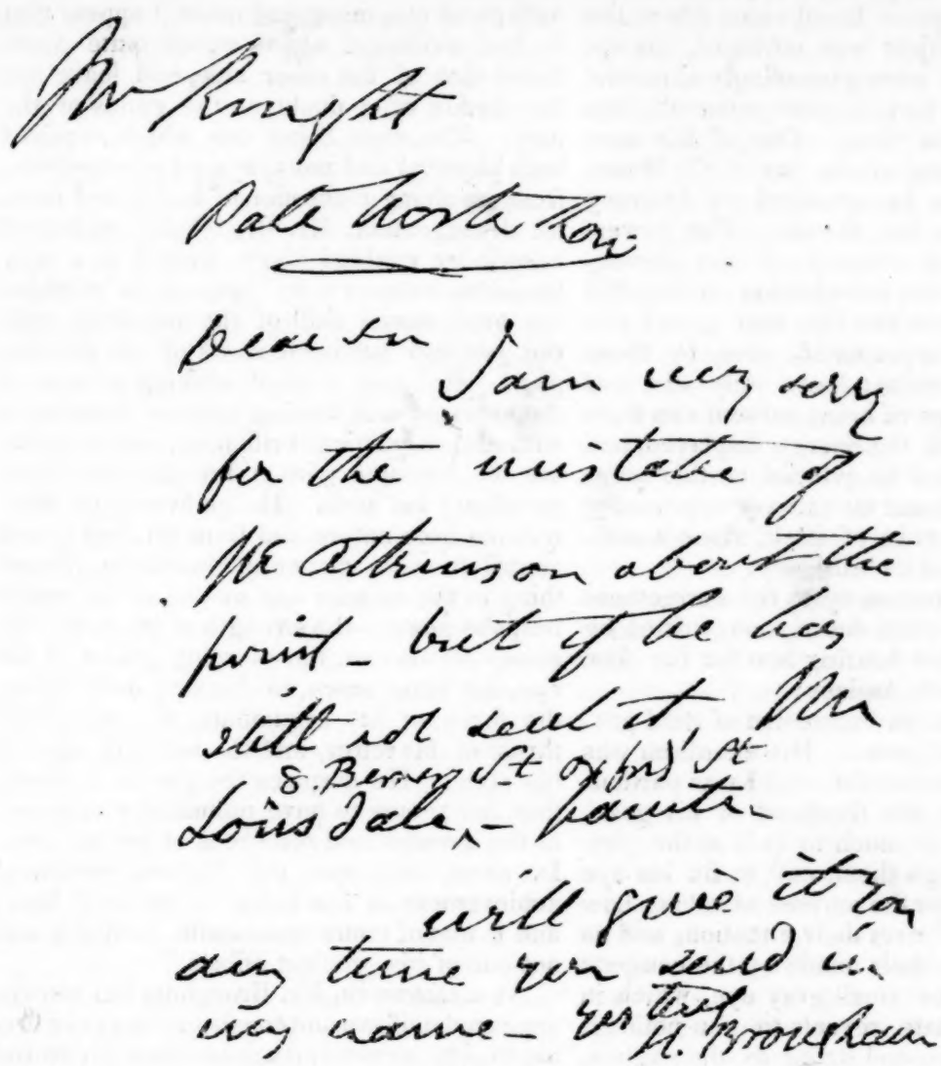
which is always improving—can never be lost. "The poor man," says Robert Hall, "who has gained a taste for good books, will in all likelihood become thoughtful; and when you have given the poor a habit of thinking, you have conferred on them a much greater favor than by the gift of a large sum of money, since you have put into their possession the *principle* of all legitimate prosperity."

Nor is it to the poor alone that this remark applies. The rich need occupation. Their hearts are often like seas, which, stagnate under a breathless atmosphere, putrify for the want of a wave. Employment, roused by some noble object, is the secret of happiness: and of all employment, mental labor lasts the longest. The body soon tires, but the mind, divided in its origin, and immortal in its destiny, pursues its labors with transient pausings; and rises from every check with fresh vigor to continue its eternal flight. What a beautiful picture does Cicero give of the secret happiness his studies opened to him! "You will not blame me, respected judges, at least you will pardon me, if, while some are hurried in business, some keeping holidays, some pursuing pleasure, and some giving their hours to sleep, while one tosses the javelin and another the dice-box, I should steal a little time for the recollection of my studies and the improvement of my mind." Yes, he loved these things better than recreation: to him they were more profitable than business, and sweeter than sleep.

Origins of Men of Genius.—Euripides, says the *Cabinet de Lecture* of Paris, was the son of a fruiteress, Virgil of a baker, Horace of a freed slave, Amyot of a currier, Voiture of a tax gatherer, Lamothe of a hatter, Sixtus the Fifth of a swine herd, Flechier of a chandler, Massillon of a turner, Tamerlane of a shepherd, Quinault of a journeyman baker, Rollin of a cutler, Moliere of an upholsterer, J. J. Rousseau of a watchmaker, Sir Samuel Romily of a goldsmith, Ben Johnson of a mason, Shakspeare of a butcher, Sir Thomas Lawrence of a custom-house officer, Collins of a hatter, Gray of a notary, Beattie of a Farmer, Sir Edward Sugden of a barber, Thomas Moore of a grocer, Rembrandt of a miller, &c. These men of genius were not men of leisure, none of them enjoyed a patrimony, and under the regime of our liberal laws, scarcely one amongst them, being neither eligible, nor even an elector, could sit in our Chamber of Deputies.

Supposed Origin of the Corinthian order of Architecture.—The above wood cut represents the leaves of a plant called the Herb Bear's Breech, the leaves of which it will be observed are large and shaggy, and the artist has given it all that beauty of form which it is said, from the accidental circumstance of the pressure on the top, to have originated in the mind of Callimachus the idea of the Corinthian order of architecture.

"It was at first used by the ancients as an ornament to friezes and cornices, and at length to the other members of architecture, but is principally employed as the grand ornament of the *Corinthian and Composite capitals*. The Greeks used for this purpose the leaves of the cultivated acanthus (*acanthus mollis*), commonly called brank ursine, or bear's breech, from its shagginess, which grew spontaneously both in Greece and Italy. The Gothic architects and sculptors, on the contrary, have used the wild and prickly acanthus (*acanthus spinosa*), being smaller in its parts and more suited to the littleness of their styles of art. Although architecture has made the greatest use of the acanthus, yet the other arts have also adopted it as a chaste and splendid decoration. We find among the ancients, as well as among the moderns, various instruments, household furniture, and utensils, ornamented with leaves of the acanthus. These artists, in preserving the general form and character of the plant, have made their sinuosities and curves more or less prominent, to suit their purposes, and have thus given them a more sculpturesque effect. In the Corinthian capital they are executed with more fidelity and elegance: the whole plant surrounds with its aspiring leaves the vase or bell of the capital, as if attempting to lift up the abacus that covers the whole, they then turn down and form themselves into graceful volutes."—[Partington.]



[We make no apology for introducing to the notice of our readers a fac simile of the writing of HENRY BROUGHAM, satisfied that it will gratify many who admire the character and talents of that distinguished individual. We shall occasionally insert engravings of the autographs of men distinguished for their literary and scientific attainments, accompanied (if possible) by a short sketch of their public character.]

SKETCH OF HENRY BROUGHAM.

[Compiled from authentic sources.]

We have not forgotten that this most distinguished individual has been raised to the Peerage, and has received the highest honors in his profession that his sovereign can bestow upon him, but we prefer to speak of him in the simple name, which, like those of GEORGE WASHINGTON, JAMES WATT, ROBERT FULTON, and many others, can never receive additional lustre by any title. He was born in Westmoreland, where his mother still resides, and at an early age was called to the bar in Scotland, where he practised as a barrister for several years, devoting a considerable portion of his time to literary pursuits. It is only with his public character, whether as a statesman, an author, a barrister, or a judge, that we have to do, and in each of these has he shone with a splendor that will long cause the name of Henry Brougham to be revered and respected.

As a *barrister*, Mr. Brougham enjoyed an extensive practice for a series of years, particularly on the Northern circuit, being generally retained by the defendant, and had, in most cases, to cope with the legal knowledge and talent of Sir James Scarlett, who, for a long time, was Attorney General for the County Palatine of Lancaster. In defending particular actions for libel, and in vindicating the general liberty of the press,

Mr. Brougham has perhaps appeared to the greatest advantage. In all cases where the liberty of the subject was infringed, his appeals to the jury were exceedingly animated —he seemed, in fact, to enter personally into the feelings of his client. One of his most splendid efforts was at the bar of the House of Lords, where he appeared as Attorney General for the late Queen. The powerful arguments in support of her remonstrance against the introduction of the *Bill of Pains and Penalties* into that house, can never be duly appreciated, even by those who have read them: those only who had the great privilege of being present can form any conception of the energy displayed, and the powers of mind he evinced, on that occasion. The profound attention it commanded from the members is, of itself, alone a sufficient guarantee of its brilliancy.

We can bear testimony to the correctness of the following vivid description, written by a gentleman after hearing him for the first time plead at York Assizes:

"He rose with an expression of staid gravity and collected power. His exordium was deliberate and impressive, and I was particularly struck with the fixedness of his gaze. He seemed not so much to look *at* the jury as to look *through* them, and to fix his eye upon them, less for the purpose of seeing how they felt, than to rivet their attention, and as it were to grasp their minds by the compass of his own. The small gray eye, which in his quiescent state reveals to you nothing, now became keen and strong as the eagle's. The steadfastness of his look, together with the calm and masterly manner in which he disposed of the preliminary considerations, reminded me of an experienced general quietly arranging his forces, and preparing to bear down in overwhelming strength upon a single point. His voice became loud and commanding, his action animated, and his eloquence was poured forth like a torrent, strong, copious, and impetuous. He first took extensive views, and laid down general principles applicable to the case: then he applied these to the particular facts, examining the testimony of each witness, and showing its weakness, the suspicion attaching to it, and its inconsistency, either with itself or with the other parts of the evidence. He displayed as much skill in exposing and concentrating the weakness of the opposite side, as in exhibiting his own strength. He lashed some of the witnesses without mercy, and covered them with his sarcasm. His sneer was terrible. He then unfolded his own case with great clearness, and made it appear that he had evidence which would quite overthrow that of the other side, and leave not the shadow of a doubt on the minds of the jury. The case being one which required both physical and metaphysical observations, from involving a question of bodily and mental derangement, Mr. Brougham's universal knowledge enabled him to treat it in a very luminous manner: he seemed to combine the professional skill of the physician with the just and profound views of the philosopher. He gave a most striking picture of the diseased and doating testator, coloring it with almost poetical brilliancy, and bringing out the features with a breadth and force peculiarly his own. He gathered his illustrations from nature and from art, and levied contributions on science and literature. Every thing in the manner and matter of the orator bespoke *power*—the strength of his voice, the sweep of his arm, the piercing glance of his eye, his bitter scorn, his blazing indignation, the force of his arguments, the inevitable thrust of his retort, and the nervous vigor of his style. He despises the graces of elocution, but seems to have unlimited confidence in the strength and resources of his intellect. In short, this was the highest oratorical achievement it has fallen to my lot to hear, and it was of course successful, though it was not one of his greatest efforts."

As a *statesman*, Mr. Brougham has always appeared uniform and consistent, never swerving from his avowed principles when he entered public life. His earliest efforts as a British senator were distinguished by the same regard to the rights of individuals, and the liberties of the country, which he has uniformly manifested to the present time. Nor was he then less firm in opposition to what he deemed the encroachments of the crown, and the extravagances and abuses of the government, than he has proved since. His bold denial of the sovereign's right to the droits of the Admiralty, in 1812, will not soon be forgotten; and, though he failed in his motion on that point, few can help wishing that he had been able, during a season of enormous expenditure, to bring that prolific fund in aid of the exchequer.—We cannot deny ourselves the gratification of extracting from a speech of Mr. Brougham in 1816, on the treaty of the Holy Alliance. After wondering at the sudden resolution of three great continental powers to defend Christianity when it was not attacked, and suspecting some secret political ob-

jects in this new crusade, he said—"I always think there is something suspicious in what a French writer calls '*les abouchemens des rois.*' When crowned heads meet, the result of their united councils is not always favorable to the interests of humanity. It is not the first time that Austria, Russia, and Prussia, have laid their heads together. On a former occasion, after professing a vast regard for truth, religion, and justice, they adopted a course which brought much misery on their own subjects as well as those of a neighboring state—they made war against that unoffending country, which found little reason to felicitate itself on its conquerors being distinguished by Christian feelings. The war against Poland, and the subsequent partition of that devoted country, were prefaced by language very similar to that which this treaty contains, and the proclamation of the empress Catharine, which wound up that fatal tragedy, had almost the very same words."

Among the most prominent of his later efforts in the House of Commons, may be mentioned his lucid speech on his introduction into that house of a "Bill to amend the State of the Laws;" it occupied nearly eight hours in delivery, and so arrested the attention of a full house, that the newspapers of that time remarked that they never remembered the house so orderly. Until the year 1828 Mr. Brougham was returned to Parliament for one of those decayed boroughs which were under the immediate influence of some of the Whig peers. In that year a vacancy occurred in the representation of Yorkshire, (the largest county in England,) and he was, without solicitation on his part, triumphantly returned to fill that vacancy, although he had no connection whatever with his new constituents. He had scarcely taken his seat when he announced that it was his intention to bring forward a bill for Parliamentary Reform. A day or two previous to the one that was arranged for the introduction of that bill, the Duke of Wellington's Tory administration was dissolved, and his Majesty called Earl Grey to his Councils. The immediate consequence of that step was the elevation of Mr. Brougham to the Peerage, under the title of Baron Brougham and Vaux,* and his appointment to fill the joint offices of *Lord High Chancellor of England*, and *Speaker of the House of Lords*. The influence and power that was thus placed under his control he has used in a manner that does honor to his heart, and is quite consistent with the principles he had always advocated, in Parliament and out of it, during a series of years. Among his earliest efforts, after his installation into office, may be mentioned *his own* motion for reducing very considerably the emoluments attached to the offices he held—his sweeping reformation of the abuses of the Bankruptcy Laws—his unceasing efforts to purge the vices of the court over which he was placed to preside—his strenuous exertions in the holy cause of Parliamentary Reform, the triumph of which is mainly attributable to his and Earl Grey's inflexible and unbending political honesty—his never-tiring advocacy of the abolition of the Slave Trade—and his arguments, whenever opportunity presented itself, (and they continually occurred in Parliament,) in favor of any and all measures that had a tendency to promote the amelioration or removal of civil and religious disabilities. When it is known that during the whole period these measures were progressing, he had almost daily to attend Cabinet Councils, of frequently three or four hours' duration, yet he did more in one short session to bring up arrears of business in the Chancery Court, than had ever previously been done, having left but one cause undecided—his predecessors frequently leaving two or three hundred,—our readers cannot but wonder at the vast power of mind and versatility of talent displayed in one individual. Nor is this all; for while thus engaged in Politics, Legal Reform, Parliamentary Reform, the duties of his office in Parliament, and the due performance of his judicial functions, it is really almost incredible that he could find time to attend to literary pursuits; yet it was so. He acted as Chairman for the *Society for Diffusing Useful Knowledge*, and very frequently attended to the duties imposed upon him by that committee; and by virtue of his office, was at the head of the *London University*, and of the *King's College* also. We now turn with peculiar gratification to notice some of the gigantic efforts he has made in the cause of universal education. His resolute efforts to throw open the corrupt arcana of the most ancient and extensive of the benevolent institutions in his own country, are well known and appreciated by a discerning and grateful public. Nor

* When it was made public that Mr. Brougham was to be made a member of the upper house, solicitations were made from many with whom he had been connected in promoting various laudable objects, that he would still retain the name of Brougham, as the association of it with institutions having for their aim the welfare of mankind seemed so natural, that it would be to them a matter of great regret to be deprived of it.

have they been without success: a commission of inquiry continues to proceed in its necessary work: several great charities have already completely changed their character, and others in fear are beginning to reform themselves.

Who can but witness with pleasure the rapid progress education is and has been making for some years past? Elementary instruction is now so quickly imparting to the great mass of the people, by the most simple and economical means, that whereas in the last generation it was difficult to find a peasant who could read, in the next it must be much more difficult to find one who cannot. This is undoubtedly one of the best signs of the present times. By this the rising age of the lower and lowest ranks are receiving a moral elevation, of which no time, or change, or accident, can deprive them. This must insure the duration of wisdom, the enlargement of liberty, and the propagation of religion, by whatever political changes the frame of society may be shaken.

To HENRY BROUGHAM we are indebted for much of this: amidst his various occupations, wherever popular education was advocated, whether at the Royal Society or at the Mechanics' Institution, he was always foremost in the van.* The great interest he took in founding the London University is fresh in our memory. He was one of the prime movers in getting into successful arrangement the operation now continued with so much success in that establishment. Nor must we omit to notice the great benefits he has rendered to universal education, by planning and forming the *Society for the Diffusing of Useful Knowledge;* among the committee of which will be found men of all political parties, of influence and wealth, and great talent, combining their efforts to spread knowledge throughout the world.

As an *author*, HENRY BROUGHAM has long been familiar with the reading public. At a very early age he communicated some scientific articles for *Dr. Brewster's Edinburgh Cyclopedia*, and ever since the establishment of the Edinburgh Review he has been a zealous supporter of that work, and some of the most profound and ingenious articles that have appeared in that work were from his pen. Nor has he confined his contributinos to the *Edinburgh Review*. He is known to be the author of several papers in *Nicholson's Journal*, and in the *Philosophical Transactions*—papers which discover the varied nature of his studies, and how well he has furnished his mind with the diversities of natural and artificial, as well as legal and political science. The chief entire work which bears his name is entitled 'An Inquiry into the Colonial Policy of the European Powers.' In addition to these, a masterly pamphlet on the state of the nation, and several speeches on special occasions, which have appeared in print, deserve to be mentioned among the samples of his literary pre-eminence. In these and other productions of his pen, he shows a capacity of mind which takes in any subject, however large its dimensions or minute its details. In all his works, he is evidently much more intent upon matter than manner; yet few men are gifted with clearer perceptions, or capable of more rich and appropriate illustrations, especially from the first rate classics, with whose best passages he seems perfectly familiar.

His last avowed production is the admirable treatise on the Objects, Advantages, and Pleasures of Science, a part of which we have already transferred into our columns.

We shall conclude this imperfect sketch by a short extract from a lecture delivered at the Jefferson Medical College, by Professor Paterson, of Philadelphia, in the sentiments of which we fully concur. He says, after alluding to distinguished men in Europe, "it has been my good fortune to have associated with many other characters, who, with justice, are admitted to be the most illustrious of her sons. Before I knew them, I confess the vastness of their intellects *loomed* on my imagination. They appeared, at a distance, more than MORTALS; but, when known and examined in person, I found them merely MEN, differing in no very remarkable features of intellect or character, from the distinguished individuals with whom I have been associated, in my native city. There is only one man I have ever known, who, from the towering height of his mind, and from the rich and exhaustless stores of his information, has realized all my imaginings of a great man—a man differing from, and far exalted, by capacity and acquirements, above all others. This MAN is HENRY BROUGHAM, the present Lord Chancellor of England. He,

* Henry Brougham and his friend, Dr. Birkbeck, were among the first who responded to the call when a proposition was made to establish the *London Mechanics' Institution;* their exertions and their example did much to promote its success. They contributed liberally to its funds, and, indeed, unless such men had taken the matter in hand, we have reason to believe the attempt to found such a society, at that time, would have been worse than fruitless.

indeed, seems to be almost more than *mortal.*"—[Ed. Mec. Mag.]

The First Steamboat Voyage.—We feel gratified at being enabled to lay before our readers a letter from Robert Fulton, giving an account of his first trip by steam up the Hudson river. It is an extract from a Philadelpbia paper of 1807, and can hardly fail of being read with interest. "When Fulton started upon this first voyage, he stood almost alone in his expectations of success. He, however, was sanguine; and could he now revisit the numerous rivers and bays of our country, he would find his expectations more than realized."

New-York, August 22, 1807.

To Joel Barlow, Esq. of Philadelphia:

My Dear Friend,—My steamboat voyage to Albany and back has turned out rather more favorable than I had calculated. The distance from New-York to Albany is 150 miles; I ran it up in 32 hours, and down in 30 hours. The latter is just five miles an hour. I had a light breeze against me the whole way going and coming, so that no use was made of my sails; and the voyage has been performed wholly by the power of the steam engine. I overtook many sloops and schooners beating to windward, and passed them as if they had been at anchor.

The power of propelling boats by steam is now fully proved. The morning I left New-York, there was not, perhaps, thirty persons in the city who believed that the boat would ever move one mile an hour, or be of the least utility. And while we were putting off from the wharf, which was crowded with spectators, I heard a number of sarcastic remarks: this is the way, you know, in which ignorant men compliment what they call philosophers and projectors.

Having employed much time and money and zeal in accomplishing this work, it gives me, as it will you, great pleasure to see it so fully answer my expectations. It will give a quick and cheap conveyance to merchandise on the Mississippi, Missouri, and other great rivers, which are now laying open their treasures to the enterprize of our countrymen. And although the prospect of personal emolument has been some inducement to me, yet I feel infinitely more pleasure in reflecting with you on the immense advantage that my country will derive from the invention.

However useful this may be, it is not half so important as the torpedo system of defence and attack; for out of this will grow the liberty of the seas; an object of infinite importance to the welfare of America, and every civilized country. But thousands of witnesses have now seen the steamboat in rapid movement, and they believe; they have not seen a ship of war destroyed by a torpedo, and they do not believe. We cannot expect people in general will have a knowledge of physics, or power of mind sufficient to combine ideas, and reason from causes to effects. But in case we have war, and the enemy's ships come into our waters, if the government will give me reasonable means of action, I will soon convince the world that we have surer and cheaper modes of defence than they are aware of.

Yours, &c.

Robert Fulton.

Simultaneous Efforts.—The power of *union* and the power of *sympathy*, when combined by simultaneous efforts, are irresistible. And there is no subject to which they may be more appropriately or more successfully applied, than to the *diffusion* of *knowledge*. And there is no branch of knowledge which more strongly invites this power and these efforts, or which is more worthy of them, than Natural History. Let the friends of Education throughout the country unite their efforts in collecting cabinets of Natural History, and in exchanging specimens, the present season, and in less than a twelvemonth every town and village in the Union might be furnished with a place of intellectual and social resort, highly interesting and useful to all classes and ages.—[Family Lyceum.]

Chesapeake and Ohio Canal.—There are one hundred and two miles of the Canal let out, under an obligation, on the part of a select body of contractors, to finish it by the 1st day of September next—thirty-five days before the expiration of five years from the commencement of the work; and there is no reason to believe that the work will not be completed within the stipulated period. On the contrary, such is the progress already made, and now making, towards its completion, that it is expected sixty-four and a half miles will be in use before the 1st of June next, and the residue by the 1st of September. There are 4,500 men at present on the various works, aided by the weekly consumption of 7,000 pounds of gunpowder, and the labor of 800 horses, oxen, and mules,

and a full complement of waggons, carts, &c. Success to the great enterprise !

On the Cultivation of Bees in Single Hives and Dwelling Houses.

The following cuts represent Dr. Thatcher's hive, which is considered altogether preferable to any that has yet been brought before the public. For the description and drawing, we are indebted to Dr. Smith's treatise on the raising of bees in cities.

DR. THATCHER'S HIVE.

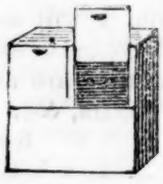


Fig. 1. This is a view in outline of a very valuable hive. The box is to be from one foot to twenty inches square. A back view, as presented in the above diagram, shows that there is a horizontal floor passing through the middle, dividing it into two equal apartments. In the lower, are cross bars for suspending the comb, as common to all hives. In the upper room, are two drawers, side by side, as represented, just filling the whole space. Through the bottom of these drawers, are small orifices, corresponding with two others through the horizontal flooring. Thus, it will be clearly understood, when the drawers are entirely in, the holes will correspond, so that the bees can run freely from the lower to the upper apartments or drawers. At the outside extremity of the drawers, (the one in sight,) a pane of glass is grooved, through which it can be ascertained what state of forwardness the deposition of honey is in. Outside of that, on a line with the box, is a slide door, represented, on the left side, as raised up, the object of which is to close it, for the exclusion of light. When the drawer is drawn out, a slip of tin is slid over the lower opening, to keep the bees below. First one drawer, then the other, may be taken out, alternating, according to circumstances.

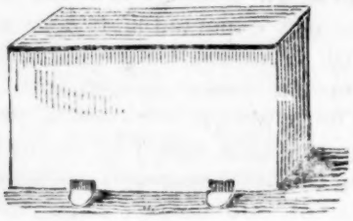


Fig. 2. This is a front view of the doctor's bee-house,—being made large enough to hold two hives, as will be noticed by the two lighting boards: no particular description is necessary, as its shape can be recognized. The door-way in the house should exactly correspond with the door-way of the hive, which is put in at the back side.

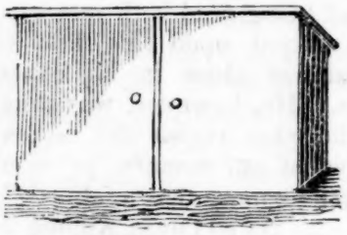


Fig. 3. The back view of the same house presents folding doors, which open for receiving and removing the hives. Trunk handles, on the ends, are very important in carrying the whole from place to place.

While on this subject we shall take the opportunity of inserting an account of Mr. Nutt's Safety Fumigator, copied from his recent work on "Humanity to Honey Bees," into the London Mechanics' Magazine:

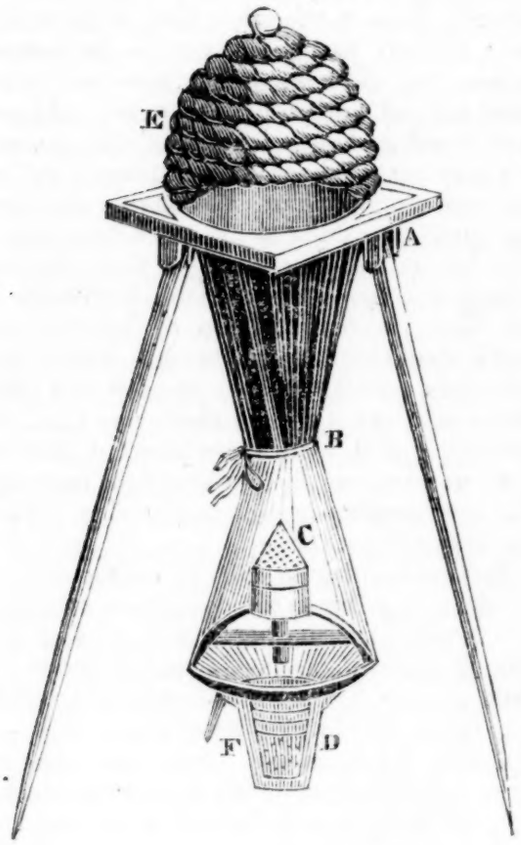
NUTT'S SAFETY FUMIGATOR.

Fumigation is rather a portentous word; but, as soon as I shall have explained for what purposes, and in what manner, I occasionally make use of it, it will be totally divested of all *deadly* signification. In my practice it is not a bee-destroyer, but a bee-preserver; when resorted to in my practice it is never carried, nor intended to be carried, to suffocation: but, in the operation of uniting weak swarms or poor stocks with more wealthy and prosperous ones, which I consider to be a meritorious and most humane practice—when it is necessary to examine the state and condition of even a populous colony, should unfavorable symptoms as to its healthiness or its prosperity manifest themselves,—when it is known, or but suspected, that there are wax-moths, mice, spiders, or other bee enemies, lodged in a hive, which the bees of themselves cannot dislodge nor get rid of, and which, if not got rid of by man's assistance, would soon destroy almost any colony,—when bees and their works (for I never transfer the former without transferring an ample sufficiency of the latter at the same time) are to be taken out of a decayed straw hive, and to be put into a more substantial one, or into collateral boxes, which I hold to be the best of all

hives,—and on innumerable other occasions,—it is absolutely necessary *to subdue bees* so far as to render them incapable of using that formidable venomous little weapon with which Providence has armed them, and which generally dreaded little weapon they can use so dexterously before we can operate upon them for their own good. By means of a very simple apparatus, which may be called *a fumigator*, and which is a contrivance as novel and as useful in the management of bees as any of my hives or other inventions, *bees may be totally subdued without being injured in the slightest degree, and dealt with as if they had neither stings nor wings.*

I beg leave to re-state distinctly—that, in taking off a box or a glass of honey, *no fumigation whatever is necessary*, or ever practised by me. It is only in cases such as those just enumerated that I have recourse to it; but in no case for the destruction of bees. Fumigation, therefore, in my practice is not suffocation.

The following figure is a representation of a fumigator, which a brief explanation will render intelligible:



This useful article consists of a square top-board, upon which is placed a straw hive (E), so as to show an open circular space under the hive and through the square board into the bag below. I need hardly observe that the straw hive is no part of the fumigator, but is here represented as standing upon it in order to exemplify its use. The top-board is of inch deal, and is nineteen or twenty inches square. A round piece is cut out of its centre of not more than thirteen inches in diameter—that being something near to, or perhaps rather more than, the inside diameter of a common hive—so that a hive will stand upon the wooden circumference of the part left, without there being any ledge inside, that is, any part so inclosed by the hive as to catch and detain the falling bees. From the upper edge of this circle is suspended a bag, a yard in length, made of glazed calico, the bottom part of which draws round the rim of a shallow, funnel-shaped, tin bee-receiver, which bee-receiver is about ten inches across at the top, and its lower part, or neck (D or F), is three inches and a half in length, and its throat (if I may so term it) is nearly three inches in width. To fit this neck, which is thickly perforated for the purpose of admitting fresh air when fresh air may be required, is a close lid, just like that of a common tin canister, to hold up the fumigated bees, and also to stop the ventilation when not wanted. C is the fumigating lamp, with a perforated top, through which the fume ascends, and is made conical, that so a fumigated bee in its fall cannot rest upon it, and be thereby scorched or injured, as would inevitably be the case were this top flat. The tie (B) closes the bag and keeps every bee above until the lamp and every thing below be adjusted, and it is *then* to be untied. The fumigator is here represented as standing upon three legs, made fast to the top-board by small bolts, as at A; but it is quite as convenient in practice, and more portable, if, instead of these legs, it be made like a common scale, with a cord from each corner, which may be gathered into a small iron hook, and thereby suspended from the branch of a tree, or from any other convenient place, when used; the lower part of the bag is represented as being transparent, but that is done purposely to show how the lamp is placed inside when prepared for operation.

By persons inexperienced in such matters, it may be thought to be an extraordinary feat to unite the bees of one hive with those of another—to bind, as it were, the legs and wings, and *pro tempore* to render

useless the sting of every individual bee, until such union be effected. Nothing, however, is more easy, nor is any part of apiarian practice attended with more pleasing consequences to the operator, or with more important and beneficial results to the bees themselves. When in a state of temporary intoxication from the fume made to ascend through the perforated tin (C) into their hive, these beautiful insects are perfectly manageable,—perfectly harmless.

This intoxicating fume is caused by introducing into the fumigating lamp a piece of ignited vegetable substance, called puck, puck-ball, or frog-cheese, or, most commonly, *fuzzball*. It is a species of fungus, or mushroom, and is plentiful enough in the autumn in rank pastures, and in rich eddishes. Shepherds, milk-maids, or country schoolboys, are well acquainted with them,—know very well where to find them,—and for a mere trifle will easily pick up as many of them as will supply the demands of twenty apiarians. They are frequently as large as a man's head, or larger. In 1826, I had an unripe white puck-ball, which weighed ten pounds. When ripe they are internally of a brown color, and, turning to powder, become exceedingly light, and are then properly *fuzzballs*. When you have procured one of these pucks, put it into a large piece of stout paper,—press it down therein to two-thirds, or, if you can, to one-half, of its original size, and tie it up very closely,—and lastly, put it into an oven some time after the household bread is drawn, that is, when the oven is nearly cool, and let it remain there all night, or until it will hold fire, and smother away like touch-wood, that is, burn without kindling into flame. In this state it is fit for the lamp, and may be used in the manner following:

Take a piece of this prepared fungus, as large as a hen's egg (it is better to have too much of it than too little to begin with); ignite one end of it with a candle, and then put it into the fumigating lamp; next fix the lamp in its socket over the bee-receiver, and place the whole inside the bag, as shown in the plate, and untie the fastening (B) round the middle. In a very short space of time the bees in the hive placed upon the top-board (which is necessarily the first thing to be attended to in every operation of this kind) will be totally under your control. The operator should be particularly careful to close every vacancy, however small, that there may happen to be between the top-board and the edge of the hive, by tying a cloth round it—the hive—as soon as ever it is placed upon the board. This precaution will prevent the escape of any of the fume, and will also prevent the bees from annoying the operator during the fumigating process.

In the course of a minute, or very little more, you will with delight hear the bees dropping like hail into their receiver, at the bottom of the fumigating apparatus.

When the major part of them are down, and you hear but few fall, you may beat the top of the hive gently with your hands, in order to get as many down as you can. Then loosening the cloth, lift the hive off and set it upon a table, or upon a broad board, prepared for the purpose, and knocking the hive against it several times, many more bees will fall down, and perhaps the queen among the rest; for as she is generally found to lodge near the crown of the hive, she often falls one of the last. If the queen is not among the bees on the table, then search for her among the main body in the bee-receiver; first, however, putting them upon the table, if you discover her not before lying among the uppermost bees therein.

During this search for the queen you must be proceeding in a similar manner with the bees in the other hive, with which those already fumigated are to be united. As soon as the bees of the hive last fumigated are all composed and quiet, and you have found and secured one of the queens, you may put the bees of both hives together into one, mingling them thoroughly together, and sprinkling them at the same time with a little ale and sugar; then put them and *one only* of the two queens among the combs of the hive you intend them to inhabit, and gently shake them down into it. When you have thus got all the bees of your two hives into one, cover it with a cloth, and bind the corners of that cloth close about it, and let them stand during that night and the next day, shut or closed up in this manner, so that a bee may not get out.

In the evening of the following day, at the dusk hour, loose the corners of the cloth and remove it from the mouth of the hive (taking care of yourself), and the bees will with a great noise immediately sally forth; but being too late to take wing, they will presently go in again, and ever after remain satisfied in and with their new abode—new, at least, to one half of them, and new to the other half also when transferred into a fresh hive, or into boxes.

Account of the Arrival of the "Comet" Fire-Engine at Berlin, and of the Experiments there made with it. [From the Allgemeine Preusische Staats-Zeitung, for Dec. 2, 1832.]

To the many useful applications of steam power which have been witnessed of late years, we have now to add that of working fire engines by steam. The merit of having first manufactured such an engine is due to Messrs. Braithwaite & Co., of London.—This machine, which consists of a 6-horse power steam engine, and the pumps worked thereby, rests upon a carriage, which can easily be drawn by two horses, and, in consequence of the peculiar construction of the steam boiler, can be brought into action in the course of thirteen minutes. Its effects are extraordinary; and its utility has been already exemplified at several large fires in London, among which may be mentioned the Argyll Rooms in Regent street—English Opera House, Strand—and, lastly, the celebrated brewery of Messrs. Barclay, Perkins & Co. On the last occasion the engine particularly distinguished itself; and after the fire, and the total loss of the steam engine and pumping apparatus, it was of extraordinary service to the proprietors of the brewery in pumping, for 25 days, the beer brewed in the part of the building that was saved, to the vats, 50 feet above the level of the street.

As the double-acting pump of the engine, which is worked by a 6-horse steam engine, is 6½ inches diameter, and makes 30.14 inches double strokes per minute, it can pump in a day of 10 hours, 8,640 cubic feet, and, in 25 days, 216,000 cubic feet, English measure, to the height of 50 feet.

The Prussian Ministry of the Interior for trade, traffic, and building, has had a similar engine, but of still greater power, made by Messrs. Braithwaite & Co. It works by an engine of 15-horse power, and is the first of its size made at their manufactory. The makers have named it the "Comet." There were several trials made of it to-day on the Building-ground of the Court-marshall office, in University street, which proved equally satisfactory with those made for two whole days at London. The engine consists of two horizontal 10 inch double-acting pumps, which are worked by two small steam engines of the united power of 15 horses. The pumps, engines, and boiler, with connectors, rest on four of Jones's (of London) patent wheels, (cast iron boxes, with wrought iron spokes and rims,) and can, notwithstanding the immense weight of four tons, (when the boiler is charged,) be easily drawn by four horses on a paved road. Those patent wheels are on the same principle as those with which the Artillery Company at Woolwich have made, according to the *United Service Journal*, such satisfactory experiments. In the course of 20 minutes from lighting the fire in the boiler, the engine was started, and made then 20 to 25 strokes per minute. The pumps being 10 inches diameter, they will draw, with 25.14 strokes, 57 cubic feet per minute, or 3,130 cubic feet per hour, and throw it through the hose to great heights and distances. To the air chamber there may be fixed four sets of hose, which can be used together or separately. By using one hose, and a jet of 1¼ inch diameter, the water was thrown vertically to the surprising height of 120 feet; and at an angle of 45° to 50°, to a distance of 164 feet. The effects of this engine are accordingly very great, and can even be increased by giving it a quicker stroke. The engine is destined, in particular, for the protection of the Royal Palace, the Cathedral, Museum, new Sufferance Warehouses and Courthouse, the Governor's Palace, his Majesty's Palace, that of her Grace the Princess of Lignitz, the Life-Guard House, the Finance Ministry Office, the Academy for Singing, the University, the Palaces of the Queen of the Netherlands and of his Royal Highness Prince William, the Library, the Office of the Minister of the Interior for Trade, &c., the Opera House, and the Royal buildings in Burg street.

For the supply of the great quantity of water necessary for the engine, cast iron suction pipes are to be laid under the pavement, with plugs to which the suction of the engine may be fixed. In consequence of this arrangement, the engine may be used as well for extinguishing the fire itself as for supplying other engines with water. As there are 400 feet of hose belonging to it, the water may even by that means be conveyed to great distances; and a large plane may be protected by placing the engine into a circle, the radius of which is 400 feet. Finally, it is scarcely necessary to observe how advantageous the application of steam is for working fire engines, whether they be on barges or carriages; in the first case without exception—in the latter where there is no want of water. The time of 13 or 20 minutes, which the generating of steam requires, with small or larger engines, is no drawback to their utility, as steam is generated whilst the horses are

being put in, and while the suction is being connected to the water pipes by engines on carriages. The engine requires an engineer, a stoker, and one to four men to attend to the hose. It saves the strength of 42 to 105 men, according to its size, from six to fifteen horse power; it does not tire, works regularly, and requires no relief. The diminution of a crowd, which is so disagreeable at a fire, and of the space necessary for many small engines—the greater distance from the fire in which this engine may be placed, and the simplification of directing firemen's exertions,—are certainly undeniable advantages. If, therefore, even the application of steam fire engines by land may be with us but small, as sufficient water can only be produced near rivers or canals, (there being no water-works,) the utility of these engines must call for their general adoption in barges, where there is no such impediment.

London Mechanics' Institution. [From the London Farmer's Magazine.]

Mr. Alexander Gordon concluded his short course of lectures on steam carriages on Friday night. The following is his conclusion:

Why, then, it is always asked, are steam carriages not running already on the highway, if the advantages be so great? Ignorance is the reason. You must remember, very few know any-thing of a steam engine; their business, their habits, their pleasures, their urgent duties, have prevented them. I venture to believe, that even in well educated society there is not 1 in 200 who knows wherein consists the difference of a high-pressure steam-engine and a low-pressure steam engine. It has not been necessary for them to know.

You know very well that you cannot pass your hand from the crown of your head to the sole of your foot, and detect any piece of dress which is not directly or indirectly the produce of steam labor. Yet 1 in 200 of well educated society might be puzzled to say with certainty that steam had been instrumental in any part of their dress. Did they but know what it has done, they might speculate on what it can do. That mighty agent, which at the word of the Omnipotent removes hills and overturns mountains, exalts valleys, and rends the earth, which may be instrumental in the "wreck of matter and the crush of worlds," when lent to man does weave a fabric delicate in texture as the gossamer's web.

How few know that in one factory alone steam spins in a single day thread 60,000 miles in length, and yet so delicate that your breath would break its continuity.

Still we are told that steam carriages will never do the country any good.

It were a curious but a fair analogy to draw betwixt cotton productions and agricultural productions. In the former it does every thing—in the latter, what? Had not this beneficent agent been extended to us, our cotton and other manufactures would now be requiring protecting duties to encourage home production. The steam engine renders such unnecessary, and we have not only abundance at home, but a ready market abroad.

India was formerly our rival in cotton fabrics. How has the steam engine altered the case! Now, although at Calicut (the place that gives calico its name), in the East Indies, labor costs only 1-7th of what it does in England, we are enabled, I may say, by the steam engine, to card, spin, and weave Calicut-gown cotton at Manchester, to dye it, to print it, and, after affixing the Oriental mark, we export it again to India. Not only is the cheap labor of the natives of no avail; we rival them in their own market, after a carriage of 28,000 miles, and they cannot tell the difference of the article.

Corn can as certainly be produced for less than 60s. in England. The anticipations of the future are strongly connected with the history of the past. We see the dawn of brighter things for renovated England,—not an obscure indication, but a distinct appearance. * * * * Agricultural produce costs in England twice the sum it does on the continent. The question then is,—Can it be produced for less? Certainly. We remember that 60 years ago a pound of cotton could only be extended to a thread of 17,000 yards, and this by the close and diligent application of a man for the whole day. But by steam power, a pound of fine cotton can now be extended into a thread of 167 miles long, with the attendance of a mere child.

Is it then too much, I ask, to expect that when the steam engine is our motive power on roads, and extends its blessings to agriculture,—to plough, to harrow, and to reap,—that then corn restrictions will be nugatory,—that then we shall have abundance at home, and may even export our corn? The cases are analogous. The results of machinery will be similar.

I cannot close this short course without thanking you for your attention, and expressing my delight that I have found you interested in the subject. It is a momentous one.

I have only shown you a meagre outline; you will find much to fill it up with by allowing it space in your thoughts.

Let me remind you, that the decision of the committee of the House of Commons was conclusive in every particular, that "the steam carriage is one of the most important improvements ever introduced."

Let me remind you, that though Hargraves, the mechanic, was an illiterate weaver, he revolutionized the cotton trade. But the members of the Mechanics' Institution, having that knowledge which is power, are a thousand times more able in this instance to change the customs of the age. Hargraves contended single-handed; but here we can unite.

Now let each costermonger's wretched horse remind you of what horses suffer.

Let each quick-going stage remind you that the effective tractive power of the horse is, by the speed which obtains, reduced to a mere fraction, and is maintained at a loss of physical power equal to 88 per cent. That the horses employed for every coach plying betwixt London and Birmingham are 100 in number, and that they do, in reality, consume the food of 800 human beings.

Let each pair of post-horses remind you that they consume the food of three fat oxen; in short, that the horses of the country consume the food of 16,000,000 of our fellow creatures. And when you hear of a shipload of emigrants, remember that, twist the case as you may, still the affecting truth will meet your inquiries—they are torn from home, country, kindred, and friends, to leave a sufficiency for the now unproductive consumers of their food.

History seems to point exultingly to the record of mechanics, and radiant with splendor shines the name of their philanthropic founder. Our excellent President (Dr. Geo. Birkbeck) has set you an example, and you will dim the lustre of his name if you remain silent or inactive spectators of this master movement in mechanics. Nay, you will betray a lack of sound philosophy and humanity,—a want of feeling for your starving fellow man, as well as a disregard for the appointments of our Maker.

The British Iron Trade.—Great Britain has been particularly fortunate in possessing inexhaustible mines of coal and iron—two natural products which give the country a prodigious superiority over the adjacent continental nations. By means of these valuable materials, and the skill of the inhabitants, we are able to export hardware goods and machinery of every description, on the most advantageous terms, to all parts of the world. From an early period the natives have enjoyed a high reputation for the manufacture of warlike weapons; and, what is justly esteemed a compliment to the people, it has more than once occurred that they have supplied fire-arms, bayonets, swords, and daggers, to the very nations with which they are at war: thus furnishing instruments for their own annoyance and destruction.

The iron trade of England is one of the chief staples in the country, and gives employment to a vast body of laborers and artizans. Every where our observation is attracted towards the combinations and results of this extensive branch of traffic, and we find that there is even less to create astonishment in the multitude and variety of the products, than in the exquisite perfection of the machinery employed—machinery seeming almost to usurp the functions of human intelligence. "No one, for instance," says a writer in the Quarterly Review, "can adequately comprehend the mighty agency of the steam engine, who has not viewed the machinery of some of our mining districts, where it is employed on a scale of magnitude of power unequalled elsewhere. In Cornwall especially, steam engines may be seen working with a thousand horse power, and capable (according to a usual mode of estimating their perfection as machinery) of raising nearly 50,000,000 pounds of water through the space of a foot, by the combustion of a single bushel of coal. No Englishman, especially destined to public life, can fitly be ignorant of these great works and operations of art which are going on around him; and if time can be afforded in general education for Paris, Rome, and Florence, time is also fairly due to Manchester, Glasgow, Leeds, Birmingham, and Sheffield. Nor, speaking of the manufactures of England, can those be neglected which depend chiefly or exclusively on chemical processes. It may be conceded, that the French chymists have had their share in the suggestion of these processes; but the extent, the variety, and success with which they have been brought into practical operation in England, far surpass the competition of any other country. These are, perhaps, from their nature and from their frequent need of secrecy, the least accessible of our manufactures to common observation; yet they, nevertheless, offer much that is attainable and valuable.

Connected with our manufactures are the great works of the civil engineer, which cover every part of the kingdom—the canals, roads, docks, bridges, piers, &c. : works which attest, more obviously than any other, the activity, power, and resources of the country."

It was lately computed that about 700,000 tons of iron are annually made in Great Britain, a very large proportion of which are the produce of South Wales and Staffordshire. In Scotland, 36,500 tons were, at the same time, made. The chief consumption of this immense quantity of metal is in the island itself, there being little more than 100,000 tons exported. The value of that which was exported was, for British iron £1,226,617, and for hardware and cutlery £1,387,204.

The great seat of the iron manufacture in Scotland is at Carron, a place in Stirlingshire, situated on the north banks of the river Carron, about three miles from the south shore of the Firth of Forth, and a short way north of Falkirk. The Carron iron works, which are reckoned one of the greatest wonders in North Britain, are the property of a chartered company, established in 1760. They are employed in smelting ores, and the manufacture of all kinds of cast iron goods, whether used in war or agriculture, domestic economy, or any other purpose. Cannon, mortars, howitzers, and carronades of every description, are here made in the greatest perfection. The *carronade* now used in warfare was first made at Carron, and hence assumed its name. Shot and bomb shells of every sort and size are also made, and on a scale which rivals the manufactories of Germany and Russia. This large establishment is placed in the midst of a country, possessed of inexhaustible stores of the materials of its manufacture, and has every facility of export. Besides these qualifications, the country is rich in every species of produce, and able to support a dense population. Including those employed in the works, and those engaged in the mines and pits, with the individuals employed in the coasting and carrying trade, the whole will amount to between 2,000 and 3,000 persons, who subsist directly by the works. To a stranger, the approach to the establishment from the north, in a calm night, is striking and terrible, from the illumination of the atmosphere, which is seen at a great distance, the noise of the weighty hammers resounding upon the anvils, the groaning of blast machines, and the reflection of the flames in the reservoir which bounds the works on the north, as in a large mirror. The scene is much admired, and often resorted to in "the calm summer e'en," even by the local inhabitants.—[Chambers' Journal.]

The Real Capabilities of Steam Carriages on Common Roads. By Saxula. [From the London Mechanics' Magazine.]

The doubts and sneers that have been cast upon steam travelling on common roads have, I believe, been principally caused by the exaggerated statements of over-sanguine inventors. The disease is not cured because the patient deceives the doctors.

I have labored hard for many years at the theory and practice of locomotion, and found I am somewhat wiser for my trouble ; but being wholly unassisted, my progress is necessarily slow. I consider all the noted steam carriages that have started have been overdriven, and will knock up in consequence. My theory and practice show me that a steam horse will do just as much as a living horse. It so happens that the working pace of steam (or piston rate) is about the working rate of a horse at his best ; namely, 2¼ or 2½ miles an hour, and at this rate either horse will draw a ton on common roads, good and bad, up hill and down, for a day together, and this is a fair horse's work.

Now, if a *real* 8 horse-power engine be made, and its total weight be 4 tons, it will draw itself and 4 tons of goods at the rate of 2½ miles an hour. At five miles an hour it will draw only itself, and at 10 miles an hour it will only exert a power able to draw half of its own weight, through all roads ; for locomotive machinery follows the laws of common machinery,—if the speed be increased the load must be lessened. 'Tis true, this 8 horse engine may be forced to much higher exertion, at the risk of speedy destruction.

It may be urged that coach horses do much more in proportion to this. True ; but they can only work a few hours each day. Let our steam horses be considered as perpetual coach horses (which is allowing a great strain on the machinery, compared with stationary machinery,) and then how will the account stand? Four horses can take a stage coach of two tons at 8 miles an hour ; consequeutly a steam engine of 8 horse power, to equal this, must weigh of itself only two tons, and have a load of two tons, being half a ton for each horse. But if the required speed be 16 miles an hour, then the engine must weigh only one ton and draw another ton. Therefore, *Query*,—Can a full 8 horse power en-

gine be made, capable of continual work, that shall weigh only one ton? If so, 16 miles an hour can be maintained, and if not, the speed must be reduced as the weight is increased; and even in this parallel, where hills or bad roads occur that require the living horses to drop their speed to a walk, and then do their best, the steam engine (at the 8 miles an hour pace) must act on a lever nearly equal to the radius of the propelling wheels. This is a simple calculation, and involves the true capabilities of steam carriages on common roads.

Theoretically, I think Mr. Walter Hancock's boiler the best, having the greatest heating surface with the least weight; but I imagine thin metal heated by blast will not wear to pay charges. In fine, I think at present a locomotive engine cannot be made substantially for regular economical work under half a ton weight per horse power; and if so, great speed cannot be expected, and long levers must be used in difficulties, which is only coming round again to my old story. I understand Mr. Hancock has been fitting up his carriage with longer leverage.

Has it ever been well considered, that in stage coaches the first mover (the horses) goes at the same rate as the vehicle? The power and resistance work an equi-armed lever, namely, the spokes of the wheels; whilst in steam carriages, *the first mover* (*the pistons*) *never exceeds* 2½ *miles an hour*, yet the vehicle is wanted to go 20 miles an hour: consequently 8 times the power are required to do it, that would be required at 2½ miles an hour.

He who builds an engine to propel a common stage waggon, will, in my opinion, soonest find his reward; and even here two steam horses will have to be maintained to do the work of one living horse, by reason of the weight of the engine, fuel, water, &c.

November 5, 1832.

Paces of the Snail.—The locomotion of animals which have no feet is a curious subject of physiological investigation, and has in some instances well rewarded the study of naturalists. The leech, the earth-worm, serpents, &c. have each their peculiar modes of progression; but the snail, as any person may observe, moves differently from all these, gliding along without jerks or undulations in any part of its body, and each point of the surface advancing simultaneously; for, the belly being smooth, with no appendages to perform the office of feet, the whole body consequently moves at once. Mr. J. Main, who has written an ingenious paper on the subject, has studied the motions of the Limax maximus, L. ater, L. rufus, and L. agrestis; and, by placing them on glass, the muscular motion was remarked to be from the tail to the head, and, of course, the movement cannot be by impulses. Mr. Main thinks the movement is produced by the propelling force of the slime projected in a retromissive manner from all parts of the body at once.

Ogle's Steam Carriage.—On Saturday morning last, Mr. N. Ogle, accompanied by Mr. Baggage, Mr. C. Bisheoff, and several other gentlemen, proceeded from the Bazaar in Portman street, to the residence of Mr. Rothschild on Stamford hill. The distance of seven miles was accomplished, notwithstanding the crowded state of the roads, in 31 minutes.—[True Sun.]

The Great British Railway.—There is now every reason to believe that the London and Birmingham Railway Bill will pass the legislature in the course of the coming session, and that the projected plan for a railway communication between Birmingham and the two northern hives of industry, Liverpool and Manchester, will also be shortly carried into effect. Proposals are also on foot for continuing the line through Carlisle to Glasgow, with a branch to Newcastle; on the completion of which the metropolis would enjoy the facility of a rapid intercourse with all the great towns of the north. As either the Southampton or the Brighton railroad scheme may be expected to succeed, we shall only want our northern friends to extend the Glasgow railway to John o' Groat's, to have an iron road from one extremity of the island to the other! Would not this afford a good opportunity of putting in practice some method for the instantaneous communication of intelligence by means of electricity?—[London paper.]

Practical Treatise upon Road-Making.—Mr. Williams, Engineer, of Cincinnati, Ohio, has issued a prospectus of a volume he proposes to publish on the laying out and constructing M'Adamized roads. Mr. W. proposes to illustrate his book with about 100 engravings, and deliver it to subscribers at the low price of

$3, bound and lettered. Such a work is a great desideratum in this country; of Mr. Williams' fitness for such a task there can be no doubt. With his prospectus he has printed letters from some of the most distinguished individuals in the United States, including engineers, presidents of turnpikes and railroads, and statesmen, friends of internal improvements—among the latter we find the names of H. Clay and J. C. Calhoun,—all agreeing that Mr. W.'s practical experience on such subjects renders him peculiarly qualified for such an undertaking. We subjoin a portion of his address to the public.

"In writing and compiling the proposed work, it shall be my aim neither to be tediously particular, nor obscurely brief; but as the safer, I intend to fall into the former rather than the latter error. My endeavors shall be to write a plain practical treatise, and not to make any unnecessary display of science or skill. The book most needed is one that might enable any person with a tolerable education, by close application, to make a first rate road, or to improve in the best manner those already made. Such a book, it is hoped, the proposed one may be. It will embrace nothing but what is connected with the laying out, the construction, the use, or the repair of those kinds of roads upon which every one may be his own carrier, or travel in the way his fancy or circumstances may point out to him. Nevertheless, it is presumed that the Canal and Railroad maker may be interested, if not instructed, by a perusal of it.

"The matter in the work will be treated in something like the following order:—Introduction, Road Companies, Charters, By-Laws, Engineers, Mapping, Superintendants, Directors, Lettings, Contracts, Masonry, Bridging, Graduation, M'Adamizing, Repairs, Tolls, Artificial Roads generally, Substitutes for stone in the construction of artificial roads, Common Roads, Street Pavements, Wharves, Landings, Ferries, Viaducts, Yards, Walks, Vehicles, &c. &c. Believing that no man of observation is so ignorant that he cannot teach, nor so wise that he may not learn, a request is made to all who can communicate any useful matter, on any of the above subjects, to do so; but, at the same time, the necessity of their paying the expense of sending their communications will appear to them, and be cheerfully borne by those who have the prosperity of the country at heart."

[*From the American Railroad Journal.*]

We are indebted to CHARLES H. HAMMOND, Esq. of Bennington, Vt., for the interesting and valuable letter from J. LOUDON M'ADAM, Esq. of Hertfordshire, England, upon the subject of road making, which will be found in this number of the Journal. It will, we are sure, without any solicitation on our part, be read with great pleasure by all who take an interest in the improvement of our system of road making, emanating as it does from a gentleman of intelligence, and long experience in the business upon which he writes.

HODDESDON, HERTFORDSHIRE, (Eng.)
November 14th, 1833.

C. H. HAMMOND, Esq. Bennington, Vt.

Sir,—In the Railroad Journal of New-York, of 21st March last, Vol. 1, No. 13, I saw a copy of a letter from you to the Hon. George Tibbets, by which I am glad to see that the science of road-making has attracted notice in America, and I am flattered by your approbation of the system which I have ventured to recommend to my country.

As an acknowledgment of my obligation to you for your favorable opinion, I take the liberty of explaining to you the difficulty, I had almost said the impossibility, of transmitting a proper and effectual knowledge of road-making by writing, so as to convey such a body of information as will enable a person to act upon it in every case and on every emergency that occurs; and unless the party directing be possessed of this knowledge, he will be constantly in danger of misdirecting in some seemingly trivial matter that deranges the works and defeats the object contemplated. However well his theory may be based on true principles, a practical man must also know, intimately, the value of every species of service to be performed by workmen, as compared with the value of labor in the country; it is in vain to expect economy to be obtained in road-making, unless the whole work be done by the laborers by piecework. Whenever day labor is the system, extravagant expenditures and boundless profusion will be the consequence.

The sub-surveyor, whose duty it is to be constantly present where the work is proceeding, ought to be able to fix the price of work by weight or measurement, and to make fair and equitable bargains with the workmen, by which they may be enabled to earn the reasonable wages of the country, using a proper degree of

industry; and the sub-surveyor ought to be a very good judge of the quality of the work, so as to insure to the public the proper value, as well as quantity of labor, for the money.

The sub-surveyor must have a perfect knowledge of what work is necessary to be done, and the manner and cost of its performance; he must be able to give to new and unpracticed workmen such instructions, and to supply them with such tools, as may enable them, with due industry, to earn fair wages at reasonable prices.

He must also have good practical experience in draining a road: difficult as it may be to explain the other branches of road making, this it is impossible to describe or to teach by any other process than experience, under a skilful person; the shape of the country, the section of the road, its situation in respect to the adjacent grounds, the nature of the soil, and many minor considerations, vary so often in every part of the same road and country, that the practice can be described and defined by no fixed rules or instructions. If the sub-surveyor be not a practically skilled drainer, the road he has the charge of will neither be good, durable, or preserved economically, unless his superior officer, the general surveyor, takes on himself this duty of directing the operation, which I and my family have been frequently obliged to do.

Our plan of distributing piece-work among the workmen is to employ them in gangs, never exceeding five men; one of whom, selected by themselves, is called the gangman, and with him the bargain is made by the sub-surveyor for pieces of work sufficient to employ the gang about a week, as no great loss or damage can happen in that time and on that quantity. If the gang do the work well, and earn fair wages by industry, they get another bargain; if idle, or disposed to slight the work, they are not again employed, by which means a road is in a short time supplied with good and expert workmen.

When the improvement of roads commenced in England in 1815, the cost of repairing the Bristol roads (178 miles) was about £19,000 annually, the roads then in such a condition as to be almost all under notice of indictment—at present the annual cost for repairs is about £13,000, including salaries for management.

I took the charge as general surveyor of the British roads in 1815, and was obliged to instruct all the sub-surveyors, (nine in number;) they again instructed others, by which process we obtained, after a few years, some skilful surveyors. We have found, experimentally, that from one to two years are necessary for instructing a sub-surveyor, according to his diligence and ability; and, even when instructed, it is prudent to place him for some time near a more experienced surveyor, or more immediately under the inspection of the general superintendant.

The system followed by my family and myself is to take charge, as general surveyors, of a number of district of roads, or, as called in England, trusts; upon these we keep one or more surveyors, according to the number of miles and the work in each trust. We employ at present, under my sons, grandsons, and myself, about a hundred sub-surveyors, and have in charge a considerable number of roads both in England and Scotland; but our system is by no means universal: many sets of trustees are attached to old surveyors, many to old practices. Economy and improvement have yet a great field to conquer in Britain—in your recent country you have fewer obstacles to encounter.

The importance of skilful and respectable superintendance in the officers of roads is ill understood in this country—deep-rooted abuses, old prejudices, and some great defects in our system of road law as to contract, have all contributed to prevent the whole benefit we might derive from good roads at a moderate cost, notwithstanding the experience of eighteen years.

I am not acquainted with the laws and regulations under which the roads in the United States are managed: perhaps their care depends upon the Legislature of each individual State; perhaps upon a still smaller subdivision of authority, whereby it may be difficult to make an exertion for attainment of the practical science necessary for the general interest; but if such an exertion could be made on an efficient scale, I am persuaded it would be of infinite benefit in producing immediately, at a reasonable expense, serviceable roads, which could be upheld at a cheap rate. It would also prevent the introduction of improper plans of road work, which are frequently found difficult to be eradicated.

Should it be practicable to induce one or all of the States to attempt the introduction of a regular uniform system of road work and road management, on the most approved and

economical plan, it would be necessary to send some persons to this country to serve an apprenticeship of not less than a year. Both classes of surveyors and sub-surveyors require the necessary practical information; their duties are distinct, although pointing to one object; their station in society ought also to be distinct.

The general surveyor should be a well informed young gentleman, entering into life with a value for character, and having connections and a station that would place him beyond the reach of suspicion himself, and give him the consequence and authority so absolutely necessary for the due discharge of his duty in defending the interest of the public, in addition to all the detail of the duties of a sub-surveyor, in which he ought to be thoroughly informed; he must be an expert accountant, so as to be able to keep an effectual and steady control over the weekly accounts of the sub-surveyors; compare the work done with the money paid, with such skill as to preclude the possibility of extensive imposition proceeding for any length of time undiscovered. This service can only be performed effectually by a gentleman perfectly qualified; and the sub-surveyors feeling themselves under the orders of an efficient officer, are attentive and careful in their conduct, but very soon throw off their circumspection when only under the authority of trustees, who occasionally, superficially and unskilfully, look into their accounts, and are quite unequal to the necessary task of comparing the extent and quality of the work done with the money expended, or of giving a little direction to the work when they find it defective.

Sub-surveyors should be selected from the class of yeomen in England—in America of respectable farmers: their early acquaintance with agricultural management has been found useful. The duty of the sub-surveyor is ministerial; he is to take the orders of trustees through the general surveyor, and to possess the skill and experience requisite to have the work performed in a proper manner, and at a fair price; to be able to measure work correctly, and to settle with the laborers. His knowledge of figures should be such as to enable him to keep an intelligible account, to fill up correctly the form of the weekly account which he will be furnished with, and to deliver it, in duplicate, every fortnight, to the general surveyor: one copy to be delivered to the treasurer, the other to remain as a record with the general surveyor, at all times open to the inspection of trustees and others intrusted.

Experience during eighteen years' practice has instructed us in many particulars that appear trivial, but which we find to be very important in making a road solid, impervious to water, smooth in the surface so as to be easily travelled upon, and consequently kept in repair at a reasonable expense. Some theoretic opinions, at first adopted, have been corrected—others given up as erroneous; the science of road-making is still capable of improvement for the benefit of mankind.

Your magnificent river, canal, and railroad conveyances, will not supercede common roads; those great works promote industry, wealth, and population. Communications must be multiplied to answer the increased demands of commerce, and connect those important works. America will require a number of stoned roads in proportion to the extension of her other great improvements; and it will in the end be greatly conducive to economy and good effect, if, at once, the States should take decided measures to have a certain number of persons practically instructed, which is the only instruction that will ever be found effectual.

Having resided fourteen years in America, and having seen the effect of severe frost and sudden thaws on roads, I am quite safe in assuring you that more skill and care in the construction of roads are required in America than in England.

I have read in the Railroad Journal of New-York, of 18th August, 1832, Vol. 1, No. 34, a kind of controversy, about a road called the Third Avenue: if that road be constructed as described by one of the disputants, I must say that there has been much labor and expense bestowed in giving the road every possible chance of being rough in the surface, and consequently inconvenient for carriages, and also providing abundantly for the mischievous effect of frost, by securing a lake of water under it, and the consequence of its erroneous formation will be great unnecessary expense.

In case of the adoption of any measures for sending persons from the United States to this country for instruction, they should be carefully selected from those who have had no opportunities of imbibing previous notions, or ima-

gining that they have any knowledge of the work they are sent to learn.

I have the honor to be, sir, your most obedient servant, JNO. LOUDON M'ADAM.

On Dry-Rot—its Causes, &c. By ROBERT MUDIE, author of "Modern Athens," "The British Naturalist," "Attic Fragments," and many other works of utility published in England.

"Well, what is this dry-rot? '*Xylostroma giganteum*, which grows in the timber like a thick, broad patch of dull yellow leather, or *serpula distruens*, in other instances, which is smaller, redder in the color, and whitish at the edge, but that last is as often found upon other timber as upon oak.' Well, that is not a point worthy of much dispute; the timber is destroyed, and, generally speaking, these (the *Xylostroma* and *serpula*) are fungi: but it is just about as sensible to call these fungi 'dry-rot' as it would be to call flowing blood 'a wound,' or the worms that consume the body 'death!' Why come the fungi there? There was a time when dry-rot was unknown; and as long as the beams of houses were of good oak, or chesnut, or red pine from the north of Europe, there was no information laid against serpula. Besides, there never appeared a single fungus of any species upon or near the piece of oak in the experiment, and yet it passed from what may be regarded as the best state that it could be in for duration, to absolute uselessness, in so short a time that, if a ship were to decay as fast, the whole freight that could be obtained would not pay for the trenails. How is the same dry-rot to be got rid of? 'Oh, wash the timbers with sulphate of iron, and other saline solutions, and let the ship, or the house, as it may be, be well ventilated.' The old story—'Call in the doctor, apply a lotion, and exhibit a bolus,' under which the diseased have continued to die ever since medicine was a science. Are ships kept less clean now than they were before the dry-rot was heard of? or are they or houses worse ventilated? Truly not. If there be any difference, the ships must be kept sweeter, else the chlorides, and other powerful fumigations, have been invented and applied to little purpose. The crews certainly keep their health better than they did formerly; and it would be somewhat wonderful, if air, which were more wholesome for human beings, should be more deadly for oak timber! As for the houses again: there are certainly more under-ground apartments than there were once, and possibly more than it is wise to have. It may happen, too, that the tax upon windows has impaired the ventilation by those apertures; but in many of the modern houses, and those especially where the rot appears, the loss of ventilation by windows has been more than made up in ventilation by walls, many of which are so thin, and of materials so infirm, that, in as far as air is concerned, the fabric is ventilator all over."

"But fungi, by what names soever they may be called, are not locomotive destroyers; they do not, full grown, career over the land and the waters, to prey upon sound timber, as hawks do to prey upon birds, or wolves to prey upon sheep. The *sporæ*, or whatever else the small and generally invisible germs of the fungus may be called, are perfectly passive, and of themselves can do no more harm to an oak beam than could be done by a mustard-seed. The soil, in which alone it can germinate, or *begin* its action, is rotted wood. If it meet with that it will germinate; if not, it will remain inactive. There is no doubt that the increasing quantity of rotted timber has increased the number of those plants; but that has in no way altered the law of their nature, which is to grow in rotten wood, but not in wood which is sound. The only rational view of the case, therefore, is that the timber must be rotten before the fungus can act even in the slightest degree; and that, consequently, the fungus is produced by the rot, and not the rot by the fungus; and though the fungus is destroyed, the rot will go on probably as fast as if the fungus were not there; only, as the fungus has a great attraction for moisture, and as moisture, though not the cause, is an instrument in producing the rot, the fungus may, when it appears, hasten the destruction."

"Imported oak has been blamed for this decay; and it is true that the imported oak, and more especially the oak imported from America, is inferior to the oak which *once* grew in the forests of England. But the deterioration is not confined to the imported oak; and however bad that may be, it could not inoculate the oaks of the forest with its deleterious qualities any more than the species of insect called American blight, which infests apple trees, could take its departure for Hereford or Devon immediately on the landing of a cargo of American apples at

Liverpool. The rot is in the timber itself—*that* is of an inferior quality; and the cause why it has been allowed to degenerate is, that they by whom oak trees have been bred have not been careful in the observation of nature, but have proceeded in their operations by means that had no natural foundation. The object of the grower has been to get goodly trees—trees that pleased the eye, without any regard to the quality of the timber; and the object of the nurseryman has been to rear up his seedlings and get them to market as soon and in as showy a condition as possible.

"It has been said that the wrong oak has been cultivated, and that may be true; for the very same circumstances which led to the wrong mode of treatment may have led to the using of the wrong plant. The collector of acorns would naturally proceed upon the joint principles of 'the most easily obtained and the most saleable.' I do not know that it is in all cases a positive fact, that the worst kinds of oak are the most prolific of acorns; but it is a sort of generally observed law among vegetables, that where there is a great deal of fruit, the wood is soft and perishable: and that has reason on its side. Trees do not work miracles any more than men do; and, therefore, if its action is more turned in any particular direction, it must be less in any other. Fruit trees are often killed *in the wood* by excessive bearing; and, therefore, it is natural to suppose that a similar excess must injure the wood of an oak. Now, it generally happens that, in the same species, whether in the same or in different varieties of the same species, the productions run largest when they are most numerous. Hence the acorns of the oak having the inferior timber are the most profitable for the gatherer, both to gather and to sell; and those two circumstances are quite sufficient to bring them to the market in preference to and even exclusive of the other—more especially as the purchaser is to grow seedlings, and not oak timber. The question of the timber is, indeed, a question *seventy years hence* with those who deal in acorns and seedling oaks, and as they have small chance of hearing any complaint that may be made about the quality, they of course give themselves very little concern about it.

"Now, if people have been able to cultivate animals into greater size and strength and beauty, and also to make them have better flesh and finer wool—if they have been able to improve by culture the beauty of flowers, and the nourishing qualities of all manner of esculent roots, stems, leaves, and fruits—it would be passing strange if their culture could do nothing for an oak tree, but make it more worthless timber. If all the earth were given to man for improvement, and he had improved much of it—as he actually has done—it would be a perfect anomaly, if timber, which is so very useful, should be the single article on which he could not lay his hand of culture without doing it an injury. It is impossible to believe that such an anomaly can exist in nature—and, therefore, the only way is to catechise the man who makes the attempt; and, if he does not understand what he is doing, send him back to nature to inform himself as to what he should do.

"There is a custom, and a very inveterate custom, which we have, and that is, the custom of generalising analogies. If there be a way in which one thing answers very well with us, we are apt to think that same way will do as well in all other things, even though the things are, in their nature, quite different. We go about to persuade ourselves that the way of doing one thing is the way of doing every thing, just as Lord Peter, in Swift's 'Tale of a Tub,' went about to persuade his two brothers, Martin and Jack, that the brown loaf was beef, and mutton, and venison, and custard; and as we are always very willing to believe ourselves, we are far more ready believers than Lord Peter's brothers.

"Now, in all our cultivations of vegetables, there is none, save that of timber trees, in which the quality of the wood is any consideration; and there is, perhaps, none of them in which the wood is not actually deteriorated by the culture. In the grain plants that is decidedly the case. Straw is very inferior to hay in strength, in flavor, and in every quality. The more highly, too, that the grain plant is cultivated, and the more abundantly it produces seeds—the grand object of the culture—the straw is always the worse. In the cold districts, where the crops of stunted oats are barely worth the gathering in, and would not be worth it at all in a place where labor is high, the straw is rich and sugary, whereas the straw of barley or wheat, grown upon land in high condition, is perfectly insipid. The former, too, is tough and firm, the latter soft and brit-

tle, with little or no substance in it of any kind.

"It is the same with all the plants. One object is to obtain a certain part of the plant more abundantly and in higher perfection than it exists naturally, and we can obtain that only at the expense of the other parts. Compare a crab-stick with a similar portion of an apple tree, a hazle twig with one of filbert, a blackthorn with a plum, (if any or all of these be respectively the wild plant and the cultivated of the same species,) and see how inferior the wood of the cultivated tree is to that of the other. 'The wild wood' is just as superior in life as it is in strength. We have difficulty in keeping the cultivated plants 'rooted in,' and we have as much in getting the wild ones 'rooted out.' A very little observation of nature, and a few very simple reflections on that observation, might have shown us that that must have been the case; and had we taken that trouble, and very small trouble it is, we should never have gone about to cultivate timber in one plant by the process whereby we destroy timber in all other plants. Yet we have done, and we continue to do that; for, grafting excepted, we breed oaks and peaches in the same ground, and much after the same manner. We may make some difference in the mould in which they grow; or we may choose that which we fancy will be the best for each; but we do not even that as observers of nature, at least as very attentive or close observers—for our good soil for oak is that on which we have seen large oaks growing, whether the timber of those oaks happened to be good or bad."

Mr. Mudie then proceeds to inquire how nature proceeds in the production of one of the old "hundred year oaks":

"When the acorns are sown by nature, they are sown *on* the surface, not under it. The sprout tends downwards, as if to reach the ground, while the acorn lies on its side upon the surface; though even then the little tubercle which is to become the tree keeps its apex upwards. It is evident, therefore, that that part of the process is *naturally* done in the air; and, though seeds are better to have the light excluded during what may be called the 'fermentative' part of the process of germination, which is the earliest stage of it, yet, in the case of the acorn, that is over before the shell is ruptured.

"Now it is very much to be suspected that it is at this early stage that the mischief is done; and I am the more inclined to that opinion from the fact that the practical men seem to know very little about the process of germination, even in those seeds which they are sowing by thousands, nay, millions, every year—there is not much, indeed, in the professed writers on Vegetable Physiology. The agency of light was not understood in the days of Grew and Malphigi; and though that agency be better understood now, there has not been *very much* added to the other branch of the science. Besides, the buried acorn does appear to make some sort of effort to come to the surface, and when it is there the cotyledons acquire a greenish tinge, which they do not acquire when buried; and that clearly shows that, in their *natural* state, they give to the food with which they supply the young plant some of that preparation which vegetable matter receives from the action of light. The condition of all blanched and etiolated plants, compared with that of the very same species freely exposed to the air, clearly shows that *carbon and astringency*, the very things in which the perishable oak timber is deficient, are among the principal results of the operation of light. These additions appear to hinder rather than to forward mere growth at the time—for an etiolated potato will rise thirty feet in the dark, whereas it would not rise so many inches if exposed to the light; but, in the case of timber, there is a gain in consolidation, and that is the main point.

"The way in which the parts of the oak 'come' farther shows the importance of light to it at the very instant the plumule begins to move. By that time the root has penetrated to a considerable depth, and is furnished with absorbent rootlets. The nourishment which these procure cannot be acted on by the light in them, and the plumule, being just beginning to move, has no leaves, so that, if the cotyledons are buried in the earth, the oak must begin life with all the weakness of an etiolated plant; and if it begins without the carbon and astringency that are necessary for good oak timber, the timber of it must be bad, how long soever it may stand, or what size soever it may attain. Future treatment may make it grow faster or slower; but no future treatment can change the character with which it starts. If it starts good timber, it may be stunted or deformed, but it will be

durable ; and if it starts bad timber, it may be showy, but it can never be good."

"Want of the proper action of light at 'starting' is not the only injury which timber trees sustain, by the way in which they are grown for the market. They are sown so close, that, while they remain in the seed-beds, they want both air and light. A seed-bed of pines, in the early stage of their growth, resembles a plat of moss more than any thing else : and when it is considered that, in the situation where they are native, the pines stand singly, and are exposed on all sides to the action of very keen air, it must easily be seen that they cannot acquire their due strength when huddled together to the number of many hundreds on a square foot. Those who are familiar with pine forests, or pine plantations, must be aware that the seeds of the cones never germinate under the thick shade of the trees, and grow up so as to form an underwood in the forest. Cones in abundance are produced every season, but they contribute chiefly to the food of the animal inhabitants, and it is only where a blank occurs, from the decay or the casual destruction of a tree, that young plants rise to fill it up. There are, indeed, few or no trees, of which the young plants grow and form underwood, while the old ones remain filling the air above; nor would it be in accordance with our general observation of nature, if they did. The young of no tribe, vegetable or animal, are the destroyers of the old ; they merely come on, in succession, when they are required, and though the germs of all are exceedingly numerous, so that there never is room on a fit soil at the proper season without the plant appearing to fill it. But man comes in with his nursery-bed ; and though he cannot be said to overstock the country (for there can hardly be too many trees—and there are numerous and wide wastes in England, where it is disgraceful that there are not millions,) yet the nursery-bed is overstocked, and the consequence is, the dry-rot in oak, and general rottenness and want of strength in all timber."

"The commercial advantages of having nurseries for forest trees, as well as other plants, near great towns, are so many, and so much, more obvious than the injuries that may thus be done to the trees, that many of them are in very tainted atmospheres. Ground there is high rented, and the plants are in consequence huddled together as closely as possible, both in the seed-beds and after they are transplanted. Still with the rich soil and skilful management in such places, the trees rush up quickly and look well, so that they are more 'taking to the eye,' and so fetch higher prices, than if they were to produce better timber. Indeed those plants, inferior as their timber must be, are actually the most acceptable to the immediate planter. Most species of forest trees are so long in coming to maturity, that the grand incentive to the planting of them is ornament and not use. Even the man who accumulates for posterity, in reality seldom does so in his own feelings of the matter ; for he who leaves the most to others when he quits the world, did not collect it for them, but for himself—for the gratification of his desire of possession. The man who plants wishes to have something to look at, and to have it as speedily as possible, and that, with the other circumstances that have been noticed, conspires to cover the rich districts of the country with growing rubbish, which, when it comes to be cut down, is fit only for fire-wood, and very inferior for that."

[*From the Baltimore American.*]

Fire Proof Roofs.—Messrs. Editors : Will some one of your numerous subscribers, acquainted in the premises, inform me, and, through me, the public, what is the original cost of a slate roof of given dimensions, and, particularly, a comparison of the result with the cost of a pin shingle roof of corresponding dimensions. Also, how long these different kinds of roofs will last respectively, supposing no extraordinary accident occur to either. The object of these inquiries has relation to a measure now but partially agitated, of vital importance to the security of our city from fire. If a slate roof costs but a trifle more than a shingle one, and answers all its purposes, and in a series of years is a great saving, to say nothing of the reduction of the premium on policies of insurance in such cases, there cannot be a doubt that our City Council, now in session, will inquire into the expediency of passing an ordinance forbidding the use of combustible roofs within certain limits in the city of Baltimore.

A communication from an experienced fireman on the subject would also be gratifying to the public. As the City Council will not be in session long, an early answer to the above in-

quiries is expedient, and the writer hopes that no one, taking an interest in this matter and competent to do what is indicated in the interrogatories, will delay what is asked, upon the vulgar but too true maxim of experience, "that what is every body's business is no body's business. A PROPERTY HOLDER.

[We shall have great pleasure in inserting a reply to the above from any of our readers acquainted with the subject.—ED. M. M.]

New-York Patent Guard Rail. Communicated by the Inventor. [From the American Railroad Journal.]

The newly invented METALIC RAIL, for railroads, called the "*New-York Patent Guard Rail*," for which the Patent right has been secured in the United States and in Europe. The Guard Rail is constructed on an entirely new principle, being, by *combination* in the process of manufacture, of *two kinds* of metal, namely, wrought iron and cast iron; so applied, that *each rail* combines within itself the principle of an *arch:* consequently they can be made of any required strength. Guard Rails of six, eight, or ten feet in length, resting their ends only on sleepers, may be made to sustain safely even ten or twenty tons to the wheel, if necessary, and remain fit for use, even if the *cast iron part* of the rail should, from any cause, become cracked in many places: they are *already made* in this city of eight feet in length, upon which ten tons have been applied, without affecting the rail; whereas *two and a half tons* to the *wheel* are probably as great a weight as will ordinarily be required upon railroads.

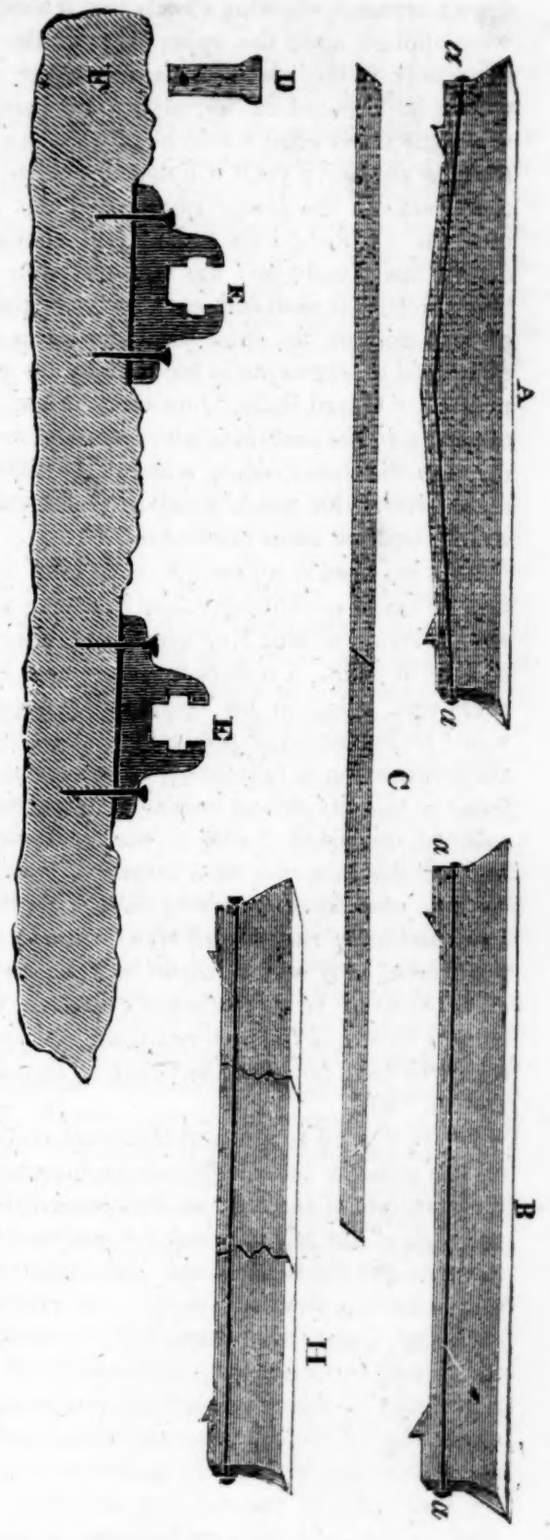
REFERENCES.

A and B represent side views, with the upper edge of rails of cast metal, with a wrought iron rod incased from end to end, and riveted at each end as at *a a*. (Rails on this principle may be made of any required form, and the annexed are not made by scale, but merely with a view to represent the combination of wrought and cast metal, as hereafter described.)

C is intended to represent the upper edge of two rails with bevel joints.

D, sectional view of the rail.

E E represent a sectional view of cast iron *chairs*, as secured upon wood or stone cross sleepers; the ends of the rails to rest in the chairs are to have corresponding notches, so as to receive keys applied horizontally.



F represents a rough wood or stone cross sleeper, squared only at spaces sufficiently large to fit the chairs E E.

H. With a view to illustrate the *principle* of the *arch* more clearly, the rail at H represents a rail with the *cast iron* part *cracked* at the lines

drawn across it, showing clearly that if a *weight* were applied upon the *upper* edge of the rail, the *cracks* in the *cast* iron at the *upper* edge would be pressed in a *contracting position*, while the *lower* edge would be pressed in a *distending* position; yet it will appear evident that the cracks in the lower edge could not open until the *wrought iron rod* at foot should be drawn apart endwise: the wrought iron rod, being riveted at each end, secures the segments of cast iron, on the same principle as an arch composed of segments is secured by its abutments. "Guard Rails," however, in use, containing a rod of *malleable* iron from end to end, through the *lower edge*, will not be liable to crack, even with much greater weight than is usually applied upon railroads.

Rails made on this principle have been examined by many scientific gentlemen, among whom were several eminent Engineers, and approved of by all of them. A remark by one of those Engineers was, "that in his opinion this discovery would be the means of producing a revolution in the construction of railroads." An eminent Professor in this city, whose opinion of its merits was solicited, remarked "that it was decidedly the best rail that has ever been invented." I allude to those remarks as resulting from a particular *examination of rails in full size for use* by those gentlemen, as it seems difficult in writing a brief description to be so sufficiently explicit as to cause a clear and full understanding of it by persons who have not an opportunity of examining the rail itself.

I have alluded to the fact, that *each* rail made on this principle becomes within itself secured on the *principle* of an *arch:* as, for instance, the upper edge of the rail in principle forms the arch—the *wrought* rod being in the *lower* edge of the rail, extending from end to end, and *riveted* at each end, forms, as it were, the abutments, so that a *weight* upon the top of the rail would have a tendency to force the particles composing the upper edge of the rail in a *contracting* position, and a tendency to force the particles composing the *lower* edge of the rail in a distending position, so that, if a rail were to break, it becomes evident that the fissure must commence at the *lower* edge of the rail; and it is also evident, that no fissure can commence in the lower edge without first drawing the *wrought* iron rod apart *endwise;* and if a wrought iron *rod*, of say one inch in diameter, be applied, of good iron, it will require a distending force of some thirty or fifty tons to draw it apart. In some instances I have had a *small* rod applied in the *upper edge* of the rail: it, however, does not add to the main strength of the rail; it has the effect merely of keeping the sections of cast iron in place, if from any cause the cast iron part of the rail should become cracked, as rails made on this principle may be *retained in use* even after the *cast iron* part of the rail becomes *cracked* in many places; the *segments* of cast iron being secured at foot by the *wrought iron rod*, on the same principle that the segments of an arch are secured by its abutments. (See Plate annexed.) I have rails with the cast iron part purposely cracked in several places, merely with a view of testing their relative strength in that respect. (See Plate, letter H.)

Permanency: The *wrought iron* part of the Guard Rail being incased in *cast* iron cannot become weakened by corrosion, and experience has proved that *cast iron* is not greatly affected by exposure; therefore there is probably no good reason for supposing, but that rails made on this principle will last fifty or even a hundred years, or more.

Saving of Capital: The saving of capital will greatly depend on the *length* of the rail used. It may be used of sufficient length to save the expense of *one-half* or *two-thirds* of the usual number of foundations or *sleepers*. This part of the saving, therefore, may be calculated on that principle, depending on the cost of sleepers in different situations; and as a further advantage, when *dispensing* with so great a proportion of foundations or sleepers, railroads can be completed and rendered productive in a proportionally less time. Rails may be made on this principle requiring sleepers, say, *six* to *ten* feet apart.

I have already alluded to rails now cast in this city of eight feet in length, upon which ten tons were applied at a single bearing without affecting the rail: these rails weighed twenty pounds to the running foot; they may, however, be made of sufficient strength with less weight of metal; and from the fact that cast iron in England is only £4 per ton, it is presumed that rails can be procured in England at about £5 10 per ton of 2240 pounds, and can with necessary fastenings be imported free of duty.

The fact last alluded to is a very important one in relation to large investments of capital in rails; these rails, imported free of duty, will at all times have an *intrinsic* value, even if broken up,

of a *profit on their original cost;* whereas rails, which are in their nature of decaying substances, after process of decay, sink the capital originally invested in them.

Use in Winter: These Guard Rails, being secured in cast iron chairs, may be elevated, the upper edge several inches above the surface, so that by the use of a snow plough, to pass upon the edge of the rail, they may be used in winter as well as in summer.

Use in Streets of Cities: These Guard Rails may be so applied in the streets of cities as to place the *upper* surface of the rail on a *line* with the paving stones; so that carriages and carts can *turn* upon them, and pass over them, without any obstruction whatever; *and further,* inasmuch as these rails require *cross sleepers* at distances only of six or eight feet, excavations may be made in streets, beneath the rails, for the *laying* or *repairing* of *gas* and *water* pipes, without injury to the railroad.

Wood Sleepers: It being that *wood* is not rapid in decay, if placed entirely beneath the surface, it may, in situations where stone are not easily procured, be used with great advantage, and degree of permanency; inasmuch as the chairs, when intended for wood sleepers, can be formed with so increased an elevation as to permit the wood sleepers to be placed *entirely below* the surface; and as such sleepers are to be applied *crosswise* the road, merely for the ends of the rails to rest upon, they may be applied in their original round state, except a small spot on the upper side, at each end, to be squared sufficiently large to fit the chairs upon, as represented at E E in the plate.

It having been matter of doubt whether cast iron chairs, so called, could be imported free of duty, I addressed a letter to the Hon. the Secretary of the Treasury, making an inquiry upon that point, and received an answer, from which the following quotation is an extract: "In reply I have to state that it has been decided that *cast iron chairs or pedestals,* with necessary fastenings for placing the iron rails thereon, are entitled to the benefit of the act of the 14th July, 1832, respecting railroad iron."

Lateral Pressure: In the construction of "Guard Rails," special care has been taken to guard against the effects of lateral pressure, which is *satisfactorily accomplished,* as will fully appear on examination of rails now made in full size for use.

Paper Carpets.—Paper carpets are formed by cutting out and sewing together pieces of linen, cotton, Scotch gauze, canvass, or any similar material, &c., to the size and form required; then stretching the prepared cloth on the floor of a large room, and carefully pasting it round the margins so as to keep it strained right. If cotton be the material, it will require to be previously wetted. When the cloth thus fixed is dry, lay on it two or more coats of strong paper, breaking joint, and finish with colored or hanging paper, according to fancy. Centre or corner pieces, cut out of remnants of papers, which may be bought for a mere trifle, may be laid on the self-colored ground, and the whole surrounded by a border; or any other method adopted which may suit the taste or circumstances of the occupier, or accord with the other furniture of the room. When the carpet is thus prepared, and quite dry, it should receive two coats of glue, or size made from the shreds of skins, such as is used by carvers and gilders. This size should be put on as warm as possible, and care should be taken that no part of the carpet should be left untouched by it, otherwise the varnish to be afterwards laid on will sink into the paper and spoil it. When the size is perfectly dry, the carpet should have one or more coats of boiled oil; and when that is dry, a coat of copal or any other varnish. The varnish is not absolutely essential, as boiled oil has been found to answer very well without it: but where oil only is used, it requires several more coats to be applied, and takes a much longer time to dry. These carpets are portable, and will roll up with about the same ease as oil cloth. They are very durable, are easily cleaned, and, if made of well chosen patterns, have a very handsome appearance.—[Encyclopædia of Cottage, &c. Architecture.]

A Garden of Bijous. By Flora Brumal.

[From the American Gardener's Magazine.]

Mr. Editor,—The following communication is from the pen of a lady. An article published in the New-England Farmer, which I now send, contains a little play of fancy on the same subject. If your columns are not likely to be crowded with matter more appropriate to the present gay and animated season, please republish the article after the one now sent. A. W.

Conversing a few days since with a friend who is an enthusiastic admirer of nature in ge-

neral, and of a garden in particular, I was struck with his description of the effect produced in his own garden on a night comparatively mild and humid, succeeding a day of snow, sunshine, and frost. His outline of a picture pleased my fancy, and in an hour of idleness I have endeavored to read the pleasing impression produced upon my imagination by the scenes he described.

Accompany me then in a fancied ramble through an Hyperborean garden, and instead of the desolate wilderness of yesterday, you will find every branch, every tendril, pendant with precious looking gems, from the pale diamond to the deeply blushing ruby; and all in vegetable form, leaf, branch, bed, and flower.

The place of the rose, usurped by its own encrusted berry, furnished us with the semi-transparent cornelian, while the fair Missouri snow-drop (escaped from the general wreck of all that is beautiful) in its new crystal envelope gives us the faint hue of the sapphire.

There too you will find the noble and capricious opal, sheltered, yet illuminated, by the thousand hanging prisms which play around it, giving all the variety and fabled succession of colors attributed to that gem. Nor is the relief of foliage wanting in this parterre of brilliants, since every leaf of the perennial box and laurel forms an emerald of exquisite and indescribable beauty.

Let us penetrate every nook and alley of this enchanted garden, where every thing above, around, beneath, is fantastical, rich and elegant. The paths are embossed with pebbles of nameless hue,—the mountain ash, with its broad sheets of scarlet berries, yielding a perfect imitation of masses of coral.

The stately fir, in its clear, cold vestment, presents itself as a tree of the aqua marina, or sea-green beryl. Music and motion, too, lend their aid to complete the illusion: every breath of heaven, agitating the heavy laden branches, teems with the sweet sounds of silver bells, scattering millions of adamantine drops on the paths before us.

Sometimes our progress is obstructed by long wavy wreaths, that fear no enemy but warmth. Now may we gather for our friends bouquets of clustering rubies from the sanguine berries of the nightshade.

Well might the sublime author of the seasons exclaim—

> "Nature, great Parent, whose unceasing hand
> Rolls round the seasons of the changeful year,
> How mighty, how majestic are thy works!
> With what a pleasing awe they swell the soul
> That sees astonished, and astonished sings."

Yonder hangs a solitary egg-plum, which, in spite of sun, shower, and storm, has hung tenaciously to its native bough, now filled, encased, and transformed by an irresistible element, it may vie with the famous Brazilian diamond of the house of Braganza.

A little further a bunch of withered purple grapes, swelled into rotundity, and burnished by the same all-pervading genius, boldly represents the glowing amethyst, which a Plutarch tells us has its name from its color, and is "wine mixed with water."

And can we leave this enchanting scene without gleaning some lesson of instruction? Is it not truly and delightfully said, "There are books in the brooks, sermons in streams, and God in every thing." May we not compare the few lingering relics of the garden, which have escaped the efforts of the burning sun and the severity of the winter's blast, to the remains of virtuous principle, which neither the warmth of prosperity nor the chill of adversity have been able to destroy.

If then even the caprices of nature yield us a useful lesson, how inexcusable are those who have neither an ear nor an eye for its constant admonitions, who suffer the most extensive and the only gratuitous library of useful knowledge to remain unread. Shall I venture to call it that splendid annual, published by its mighty author for nearly six thousand years, every page of which furnishes an inimitable picture of human life, and every line of which presents us an idea and a moral.

The study of nature leads to nature's God. The most ambitious literary aspirant can reach no higher.

FLORA BRUMAL.

THE GARDEN.

Lansingburg, December, 1832.

One of the most interesting spectacles ever witnessed in the garden at this dreary season, (when Nature has stripped vegetation of its glories, and consigned her lovely offspring to their season's repose,) was noticed the early part of this month. A light fall of snow had been suddenly melted by the power of the sun's rays, whilst the thermometer was below the point of freezing. The consequence of this conflict between the two contending pow-

ers of heat and cold was that the whole remains of the vegetable tribe were suddenly converted into a mass of shining crystalization. Every tree, every shrub, and every ornamental fixture, were all in the space of a few hours completely enveloped in an icy coat of mail, of the most dazzling transparency, which during two days defied the power of the solar beam.

A group of weeping trees particularly attracted attention; whilst gazing on their pendant slender branches loaded with the purest icicles, the imagination was led to the classic recollection of the weeping deities, whom Ovid described as being converted into trees, and their tears into amber. They might indeed be called the tears of nature on the stern appearance of winter; and yet as the sunbeams elegantly danced among the branches, reflected from every spray, she seemed to be smiling through her tears. —The three-thorned locust exhibited its spikes in dazzling array. The crimson fruit of the barberry appeared like a cornelian enclosed in a diamond. The blackberry of the prim, the delicate snowberry, and the large roan tree berries, were peculiarly beautiful, whilst the humble box and the modest wintergreen had their color heightened by their case of crystal, more than equalling them in beauty. But how soon, how very soon, are these frail fabrics seen to melt away, and involve in their desolation so many gems.

The garden scene so lovely induced a stroll to a neighboring forest. There all was found chilling and unearthly: nature had dressed the whole woods as if for her own amusement —all was awfully grand and impressive. The idea occurred that the whole surface of the earth had been deadened by the paralyzing touch of winter. In the attempt to explore the woods the progress was slow through the brush wood—the branches neither yielding nor resisting, but snapping asunder on a moderate pressure, scattering fragments of crystal in all directions.

What a grand subject for the pencil! Every object around had received its portion of decoration. The very fences and stones were tastefully festooned and fringed, assuming a very picturesque appearance. Such a scene as this induces the reflection that if winter has its horrors, it has its beauties too;

"Let Winter come with stormy voice,
Let snow-wreaths crown the highest hill;
He bids thee in the storm rejoice;
He sees, protects, and feeds thee still."

Specification of Mr. Scrivenor's Patent for Improvements in the Construction of Iron Railways. [From the London Repertory of Patent Inventions.]

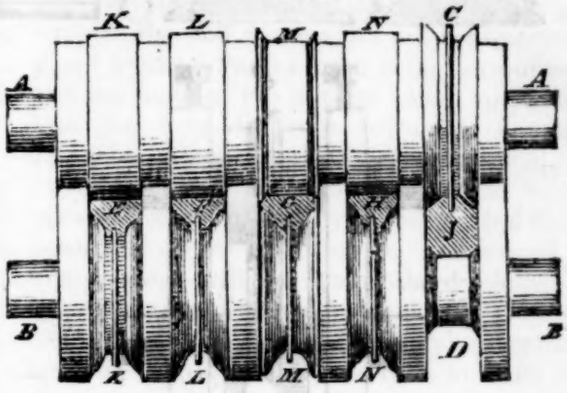
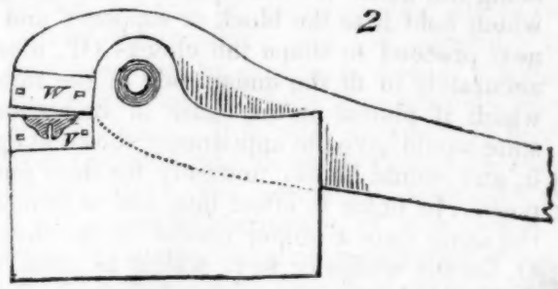
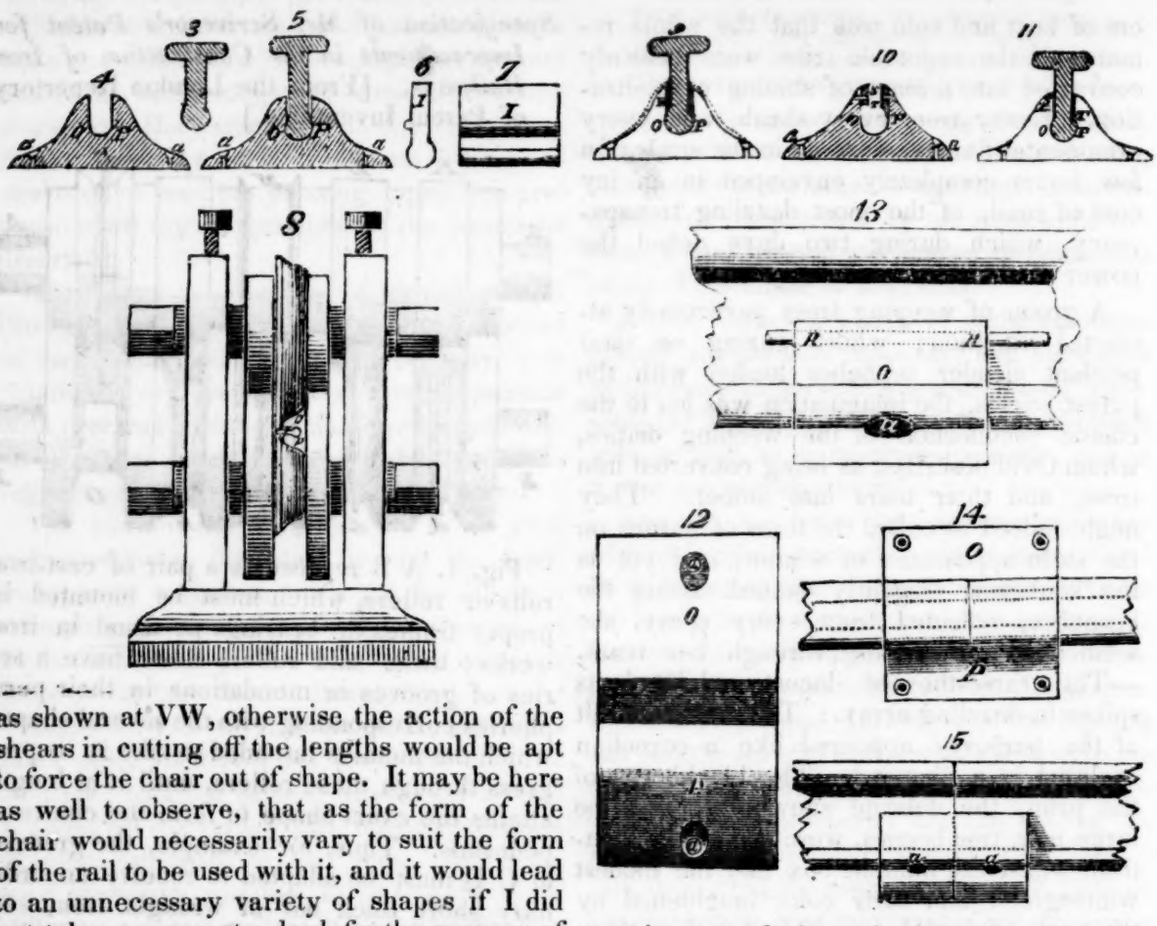


Fig. 1. A B represents a pair of cast-iron rolls or rollers, which must be mounted in proper frames or bearings as usual in iron works; these said rollers must have a series of grooves or mendations in their peripheries corresponding with the several shapes which the metal is intended to take in its progress through these rollers, until it at length attains the exact shape to form the chairs or pedestals. Thus, for example, the grooves at C D must be adapted to receive an ordinary short thick bar of wrought iron, say about two feet long and about six inches square, properly heated for rolling, and, in fact, of a size adapted for these said grooves, all which is well understood by persons accustomed to roll iron.

The bar is first passed through the rollers at C D, which causes it to assume the shape shown at J. It is then passed in succession through the other grooves on the rollers at KK, LL, MM, and NN, whereby it successively takes the forms shown at E, F, G, and H. Having thus obtained a long bar of iron, of the form shown in section H, I next proceed to cut it into lengths for chairs, which I perform by means of a pair of mill shears, shown at fig. 2; these shears may be worked



in the ordinary manner, but must be provided with steelings or jaws to receive the chair,



as shown at VW, otherwise the action of the shears in cutting off the lengths would be apt to force the chair out of shape. It may be here as well to observe, that as the form of the chair would necessarily vary to suit the form of the rail to be used with it, and it would lead to an unnecessary variety of shapes if I did not take one as a standard, for the purpose of describing my invention, I have selected that form of rail which I believe to be one of the most approved and most generally in modern use, and need only state that chairs may be made of wrought iron, on the same principle which I am now describing, to suit any of the ordinary forms of rail now in use; but for the purposes of this specification I shall confine my description to the form of chair required for the form of rail shown in section at fig. 3.

Having, in manner hereinbefore described, cut the rolled bar into proper lengths for chairs, they will assume the form shown at fig. 4, which is a transverse section, *aa* being the holes for the spikes or fastenings which hold it to the block or support; and I next proceed to shape the cheeks OP, more accurately to fit the under side of the rails, which if placed in the chair in its present state would have the appearance shown at fig. 5, and would be too unsteady for their purpose. In order to effect this, and to form at the same time a proper recess in the cheek O, for the wedge or key, which is used to wedge or key up the ends of the rails tight in the chair, I make use of a cold wrought or cast iron mandrel, as shown at figs. 6 and 7, in the following manner: Having heated the chair again in the furnace, I place the mandrel between the cheeks, OP, of the chair, and present it with the mandrel in it to pass through another pair of rollers, as shown at fig. 8, which rollers press the cheeks OP close upon the mandrel, I; and when the chair leaves these rollers it is complete; and if the mandrel be withdrawn, and the rail now inserted in it, will have the appearance shown at fig. 9, being the recess or aperture into which the wedge or key is to be driven to fix the rails firmly and steadily in their places. The dotted lines in this figure show the alteration in form which the chair has experienced by passing through the rollers shown at fig. 8.

Fig. 10 represents a wrought iron chair, made of more than one piece, and in this chair the cheeks of the chair are made to fit the rail by rivetting pieces of iron rolled to the proper shapes, to the cheeks of the chairs, after they leave the rollers at NN, fig. 1, in which case they will not require to be passed through the rollers shown at fig. 8. Fig. 10, which is now under description, represents a chair in the state in which it is left by the

action of the rollers at NN, fig. 1, and as shown at fig. 4, the cheeks O P having plane sides, or being parallel to each other. This fig. 10 exhibits a section of the chair, in which S T represent pieces of rolled iron firmly secured to the insides of the cheeks O P, by rivetting, as aforesaid.

Fig. 11 exhibits it in this latter state, with a wrought iron placed within it, and secured firmly by means of an iron wedge or key, driven tightly underneath the overhanging piece S, and pressing upon the shoulder of the rail at Q. This plan of wrought iron chair will be found useful when the lower part of the rail for which it is intended may be of any shape, differing from the ordinary kind.

Fig. 12 is a plan of a chair of the full size, and fig. 13 a side view of it with part of a rail placed in it: and fig. 14 is the plan, and fig. 15 the elevation, of another and broader chair, calculated to receive the ends of two rails, and to hold them more firmly than the narrower one shown before.

Now, whereas I claim as my invention the substitution of wrought or malleable in the place of cast iron, in the construction of those parts of iron railways called chairs or pedestals, whether the same be made in one single piece or of separate pieces, rivetted, or otherwise fastened together as hereinbefore described; and such, my invention, being to the best of my knowledge and belief entirely new, I claim the exclusive right and privilege to my said invention.

In witness whereof, &c. &c.

On the Stomach Pump—Method of dislodging Poison from the Stomach without it, &c.

By Dr. Arnott.

A small pump, called the *stomach pump*, has lately been used in medical practice, for removing poisons from the stomach in cases where the action of vomiting could not be excited. It has already saved many lives. It resembles the common small syringe, except that there are two apertures near the end, instead of one, which, owing to valves in them, opening different ways, become what are called a *sucking* and a *forcing* passage. When the object is to extract from the stomach, the pump is worked while its sucking orifice is in connection with an elastic tube passed into the stomach, and the discharged matter escapes by the *forcing* orifice. When it is desired, on the contrary, to throw cleansing water, or other liquid, into the stomach, the connection of the apertures and the tubes is reserved.

As a pump may not be always procurable when the occasion for it arises, the profession should be aware that in many cases a simple tube will answer the purpose as well, if not better. Such a tube being introduced, and the body of the patient being so placed that the tube forms a downward channel from the stomach, all fluid matter will escape from the stomach by the tube, as water escapes from a funnel by its pipe; and if the outer end of the tube be kept immersed in liquid, there will be during the discharge a syphon action of considerable force. On then changing the posture of the body, water may be poured in through the tube to wash the stomach, and may by the same channel be again discharged. Such a tube, made long enough, might, if desired, be rendered a complete bent syphon, the necessary preliminary suction being produced by a syringe, or by the mouth of an assistant, acting through an intervening vessel.

But there is a still easier mode than either of these now described, of dislodging poison from a torpid stomach, *viz.* merely to place the patient so that the mouth shall be considerably lower than the stomach,—as when the body lies across a chair or on a sofa, with the face near the floor,—and then, if necessary, to press on the stomach with the hand. The cardiac orifice opens readily in such a case, and the stomach is inverted like any other inverted vessel.

Useful as the pump may prove upon occasions, in evacuating the stomach, its more ancient office of injecting the enema is still the more important, and recent experience seems to show that such injection may become a remedy of more extensive utility than had yet been suspected. From an erroneous opinion, that what had been called the *valve of the cœcum* acts as a perfect valve, allowing passage downwards only, few practitioners have ventured to order much liquid to be injected, for fear of overstretching the lower part of the intestine; and the possibility of thus relieving, by injection, disease situated above the supposed valve, has scarcely been contemplated. It is now ascertained, however, that fluid may be safely thrown in, even until it reach the stomach. Perhaps few, if any, cases of obstruction of bowels could resist the gentle force of penetrating water, so that a mechanical remedy of certain effect may, in many cases, be substituted for the drastic purgatives and pernicious bleedings

now used, and often used in vain. From what has been said above of the abdomen and the intestinal canal, it appears that an injection tends to spread itself with singular uniformity over the whole. This tendency may be rendered obvious to sight, by throwing a sheep's intestine, recently extracted, into a bucket of water, and then pumping water in at one end: a stream will issue strongly at the other end, although several feet distant, almost immediately, and without any intermediate part having become very sensibly tense. Of course, in the living body, in cases of spasm or obstruction, the liquid must be thrown in against resistance very gradually.

That case is called *introsusception* of the bowel, in which an upper portion falls, or is received into a portion below,—as one part of the finger of a glove may be received into another part,—and the receiving portion of the bowel, mistaking the received for descending food, holds it fast. This occurrence forms a complete obstruction, and generally proves fatal. Many infants, with irritable bowels, die of it. Now, a copious enema, such as we have described above, is almost a certain cure. The liquid advances until it reaches the part where the portion of gut has been swallowed by gut below; and as it cannot pass without pushing the introsuscepted portion back to liberty, it effects the cure.*

Attraction.—By *attraction* we mean the tendency that bodies have to approach each other. And first, in elucidation of this subject, if you throw a stone, or shoot an arrow into the air, instead of proceeding according to the direction in which you send it, you see its course is quickly spent, and it returns to the earth with a velocity or swiftness proportioned to its bulk or weight. Now, it is easy to conceive that the resistance of the air may stop it in its progress: but why should it return? Why should not the resistance of the air stop or impede it in its return?

The answer you will think very plain—it is its *weight* that brings it back to the earth, you will say, and it falls because it is a heavy body. But what is weight—or why is it heavy? It is, in truth, the earth that draws or *attracts* the stone or the arrow towards it; this overcomes the force with which you sent it from you at first, and the resistance which the air would otherwise make to its falling.

To make this plainer, if you drop a little water, or any other liquid, on a table, and place upon the liquid a piece of loaf sugar, you will see the water or fluid ascend, or in vulgar language, be sucked up into the pores of the sugar: that is, the one attracted by the other. Again, if you take two leaden bullets, and pare a piece off the side of each, and make the surface, where you have taken off the piece, exceedingly smooth, and then press the two balls together, you will find them adhere strongly together, that is, they are mutually attracted by each other.

If you take a piece of sealing wax, or amber, with a smooth surface, and rub it pretty quickly upon your woollen stocking till it gets warm, you will find that if straws, feathers, hairs, or any very light bodies, are brought within the distance of from an inch to half an inch of it, these light bodies will be drawn to the sealing-wax or amber, and will adhere to it. Thus, in philosophical language, they are attracted by it.

This last effect is very similar to what may be observed of the magnet or loadstone, or what is often performed by the little artificial magnets, which are commonly sold, and which afford a very rational and pretty amusement to young persons.

But what is a still more surprising effect of attraction, if we take two phial bottles, which we number 1 and 2, and fill each of them with a fluid perfectly colorless, we see they appear like clear water: on mixing them together, we will observe the mixture becomes perfectly black. We take another phial, No. 3, which contains also a colorless fluid, and we pour it into this black liquor, which again becomes, we see, perfectly clear, except a little sediment which remains at bottom. Lastly, we take the phial, No. 4, containing also a liquid clear like water, and by adding a little of it, the black color we see is restored.

All this appears like magic, but it is nothing more than the effect of attraction. Philosophy keeps no secrets, and we will explain it. The colorless liquor in the phial No. 1 is water, in which bruised galls have been steeped or infused; that in No. 2 is a *solution of copperas* (called by chemists *sal martis*, salt of steel,) in plain terms, it is water in which common copperas, or green vitriol, is

*It should be remarked, however, that this can succeed only whilst the introsusception is recent. After a time inflammation occurs, and adhesions form between the introsuscepted portion and the portion of bowel in which it is received.

dissolved. The iron which this salt (green vitriol) contains has a strong attraction for the gall water, and when they are mixed together they unite, and the mixture becomes black; in fact, is made into ink. But when the phial No. 3, which contains aqua fortis, (or the nitrous acid, as it is called by the chemists,) is poured in, the iron, which has a stronger attraction for it than for the galls, unites with it, and having left the galls, the liquid is again clear.

Again, the phial No. 4 contains salt of wormwood, in a fluid state, which the chemists call an *alkali*. The aqua fortis is nitrous acid, therefore, has a stronger attraction for this alkaline matter than it has for the iron; it therefore drops the iron, which again unites with the matter of the galls, and you see the fluid resume its black complexion. These several kinds of attractions, which we have now mentioned, philosophers have arranged under five distinct heads. The *first*, that we mean of the stone or the arrow falling to the ground, they have called the attraction of *gravity*, or gravitation.

The second, that of the two leaden balls adhering together, and of the water ascending into the pores of the sugar, they call the attraction of *cohesion*, and also capillary attraction. The third is *electrical* attraction, because the sealing wax, when chafed or warmed by rubbing against your stocking, is in an electrified or excited state, like the glass cylinder of an electrical machine when rubbed against the cushion, and therefore attracts the hair, feathers, &c. The fourth is the *magnetic* attraction; and the fifth is called *chemical* attraction, or the attraction of combination, because upon it many of the processes and experiments in chemistry depend; and because by this means most of the combinations which we observe in salts, the ores of metals, and other mineral bodies, are effected.

On the two first of these species of attraction only we shall at present enlarge, because it will be necessary to treat of the others when we come to investigate those branches of science to which they properly belong.

First, therefore, of gravitation. It requires no experiment to show the attraction of gravity; for since the earth is in the form of a globe, it is manifest that it must be endued with a power of attraction to keep upon its surface the various bodies which exist there, without their being hurled away into the immensity of space in the course of its rotary diurnal (or daily) motion. The earth has, therefore, been compared to a large magnet, which attracts all smaller bodies towards its centre. This is the true cause of *weight* or *gravity* (which mean the same thing.) All bodies are drawn towards the earth by the force of its attraction, and this attraction is exerted in proportion to the quantity of solid matter which any body contains. Thus, when two bodies are placed in opposite scales, and we see one preponderate, we say it is heavier than the other; in fact, that it contains a greater quantity of solid matter: for as every particle of matter is attracted by the earth, the greater number of such particles any body contains, the more forcibly it will be attracted. We know, by experience, that the *weight* or *gravity* of a body or thing is not in proportion to its bulk. A bullet of lead, of the same size as one of wood, or of cork, will weigh infinitely heavier, and one of gold would be heavier still. It is reasonable, therefore, to suppose that the ball of gold, or of lead, contains a greater number of solid particles, which are united or pressed closer together than those of the wood or cork, which is more porous, and its particles lie less closely compressed or compacted together. This, then, is what is meant by *specific gravity*, that one body contains more solid particles within a certain compass, size, bulk, or space, than another.

It is one of the laws of nature, discovered by Newton, and now received by all philosophers, that every particle of matter gravitates towards every other particle: which law is the main principle in the Newtonian philosophy. The planets and comets all gravitate towards the sun, and towards each other, as well as the sun towards them, and that in proportion to the quantity of matter in each.

All terrestrial bodies tend towards a point, which is either accurately, or very nearly, the centre of the earth; consequently, bodies fall every where perpendicular to its surface, and therefore on opposite sides in opposite directions. As it acts upon all bodies in proportion to their quantities of matter, it is this attractive force that constitutes the weight of bodies.

The cause of gravity is totally unknown. Many theories have been invented to account for it, but they have been all mere hypothesis or conjecture, without any solid foundation.

II. The *attraction of cohesion* is observable in almost every natural object, since in reality it is that which holds their parts to-

gether. It has been already demonstrated, in the experiment of the two leaden balls, and the same effect will be proved by pressing together the smooth surfaces of two pieces of looking-glass, particularly if a little moisture is dropped between them to exclude the air more perfectly. The adhesion or tenacity of all bodies is supposed to depend on the degree of this attraction which exists between their particles; and the cohesive power of several solid substances has been ascertained by a course of experiments, in which it was to put to the test what weight a piece of each body of one tenth of an inch diameter would sustain, and the weights were found to be as follows:

Raw flax, .	37 lbs.	Ash, . .	50 lbs.
Horse hair,	45	Zinc, . .	18
Raw hemp,	46	Lead, . .	29¼
Raw silk, .	53½	Tin, . . .	40½
Fir wood, .	23	Copper, .	299
Elm, . .	35	Brass, . .	360
Alder, . .	40	Silver, . .	370
Oak, . .	48	Iron, . .	450
Beech, . .	50	Gold, . .	500

This cohesion is also visible even in fluid substances, the particles of which adhere together, though with a less degree of tenacity than solid bodies. "The pearly dew" is a well known phrase in poetical language, and the drops of rain, or of dew, upon the leaves of plants, assume this round or pearly appearance by the attraction which the particles have for one another. In the same manner quicksilver, if divided into the smallest grains, will appear round, like small shot, because the particles attract each other equally in every direction, and thus each particle draws others to it on every side, as far as its power extends. For the same reason, two small drops of quicksilver, when brought near to each other, will seem to run together and unite.

Some bodies, however, in certain circumstances, appear to possess a power the reverse of attraction; and this is called in philosophical language, *repulsion.*

Blasting Rocks under Water.—Three men are employed in a diving-bell; one holds the jumper, or boring iron, which he keeps constantly turning; the other two strike alternately quick smart strokes with hammers. When the hole is bored of the requisite depth, a tin cartridge, filled with gunpowder, about two inches in diameter, and a foot in length, is inserted, and sand placed above it. To the top of the cartridge a tin pipe is soldered, having a brass screw at the upper end. The diving bell is then raised up slowly, and additional tin with brass screws are attached, until the pipes are about two feet above the surface of the water. The man who is to fire the charge is placed in a boat close to the top of the tube, to the top of which a piece of cord is attached, which he holds in his left hand. Having in the boat a brasier, with small pieces of iron red hot, he drops one of them down the tube; this immediately ignites the powder, and blows up the rock. A small part of the tube next the cartridge is destroyed; but the greater part, which is held by the cord, is reserved for future service. The workmen in the boat experience no shock; the only effect is a violent ebullition of the water, arising from the explosion; but those who stand on the shore, and upon any part of the rock connected with those blowing up, feel a very strong concussion. The only difference between the mode of blasting rocks at Howth and at Plymouth is that, at the latter place, they connect the tin pipes by a cement of white lead. A certain depth of water is necessary for safety, which should not be less than from eight to ten feet.—[Repertory of Patent Inventions.]

Vitality of Insects.—If the head of a mammiferous quadruped, or of a bird, is cut off, the consequences of course are fatal. But the most dreadful wounds that imagination can figure, or cruelty inflict, have scarcely any destructive influence on the vital functions of many of the inferior creatures. Leeuwenhoeck had a mite which lived eleven weeks transfixed on a point for microscopical investigation. Vaillant caught a locust at the Cape of Good Hope, and after excavating the intestines, he filled the abdomen with cotton, and stuck a stout pin through the thorax, yet the feet and antennæ were in full play after the lapse of five months. In the beginning of November, Redi opened the skull of a land tortoise, and removed the entire brain. A fleshy integument was observed to form over the opening, and the animal lived six months. Spallanzani cut the heart out of three newts (in Scotland called *asks,*) which immediately took to flight, leapt, swam, and executed their usual functions for 48 hours. A decapitated beetle will advance over a table, and recognize a precipice on approaching the edge. Redi cut off the head of a tortoise, which survived

18 days. Colonel Pringle decapitated several libellulæ or dragon flies, one of which afterwards lived for four months, and another for six; and, which seems rather odd, he could never keep alive those with their heads on above a few days.—[Ency. Brit. new edit.]

SMITH'S PRINTING PRESS.

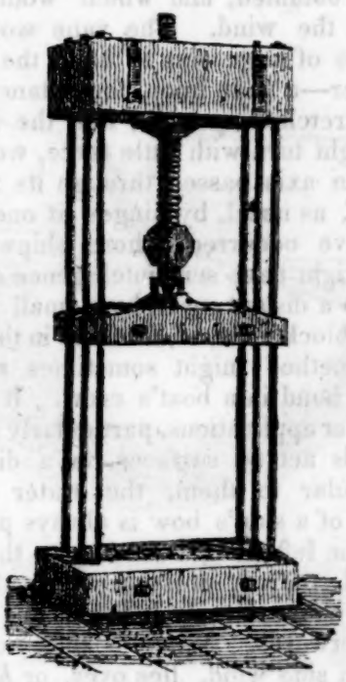
This press, manufactured by Messrs. R. Hoe & Co. of this city, is in great request by many of the printers in the United States, and deservedly so. As it is necessary, in order to get it conveyed to distant parts of the country, to send it in detached pieces, we here insert directions for putting it up:

It will be necessary to observe that all the connecting parts are marked or indented by points, which, if carefully observed, the press will be put together without difficulty.

After setting the frame upon its legs, and putting on the ribs and bed, lay the platen on the bed, between which two bearers should be laid about type-high. (The front end of the platen is marked F. T.) Then put the springs in their places, and the nuts over them, and pass the suspending rods through them, observing the numbers of indentations on them and the platen, on which they are to be screwed fast, so as to get them in their proper places. Give the nuts two or three turns, then screw the suspending rods fast to the platen, after which put in the bar-handle, wedge and knees; and also the wedge through the top of the frame, which regulates the impression. Then turn the nuts on the suspending rods, so as to compress the springs just enough to give the platen a quick retrogade motion; observing, at the same time, to get the surface of the platen parallel with the surface of the bed.

After having put the press together and levelled it, be particular not to raise the end of the ribs by the gallows, but let it go under rather loose, which will have a tendency to make the bed slide with more ease on the ribs.

PATENT STANDING PRESS.



The above Patent Standing Press is also manufactured by them; its construction is so simple that any description is unnecessary.

NOVEL MODE OF PRESERVING HUMAN REMAINS.—M. Barruel, an eminent French chymist, boasts of being able to extract iron enough from the blood of a deceased person to strike a medal the size of a 40 franc piece. "He that hath the ashes of his friend," says Sir Thomas Brown, "hath an everlasting treasure." What would the learned author of the *Hydriotaphia* have said had he known the possibility of possessing iron relics?—[Medical Gazette.]

Self-Steering Ship. [From Elements of Physics, or Natural Philosophy, General and Medical.]

It is possible to make a ship or boat steer itself, by placing a powerful vane on the mast head, and connecting it with the tiller-ropes by two projecting arms from its axis. If it were desired to make the ship sail directly before the wind, the tiller-ropes would be fixed to the vane so that the helm should be in the middle position, when the vane were pointing directly forward; should the vessel then from any cause deviate from her course, the vane, by its changed position with respect to her, would have produced a corresponding change on the position of the helm, and just such as to bring her back to her course. Again, it is evident that, by adjusting such a vane and rudder to each other, in different ways, any other desired course might be obtained, and which would alter only with the wind. The vane would require to be of large size to have the necessary power—a wide hoop, for instance, with canvass stretched upon it; and the rudder, that it might turn with little force, would be hung on an axis passed through its middle, instead of, as usual, by hinges at one edge. Cases have occurred where shipwrecked persons might have sent intelligence of their disaster to a distant coast, by a small vessel, or even a block of wood, fitted up in this way; and the method might sometimes save an additional hand in a boat's crew. It admits also of other applications, particularly in war.

As fluids act on surfaces, in a direction perpendicular to them, the water on the right side of a ship's bow is always pressing towards the left side; but owing to the equivalent and contrary pressure there, the ship holds her course evenly between the two, or straight forwards. When a ship, however, owing to a side wind, lies over, or *heels*, as it is called, that side of the bow which sinks most is more pressed than the other; and were it not for a counteracting inclination of the rudder then made, constituting what is called *weather helm*, the ship's head would come round to the wind. Now, ships so rarely have the wind exactly astern, that, to diminish the almost constant necessity for weather helm, the mast or masts, and consequently the mass of the sails, are placed more towards the bow than the stern.

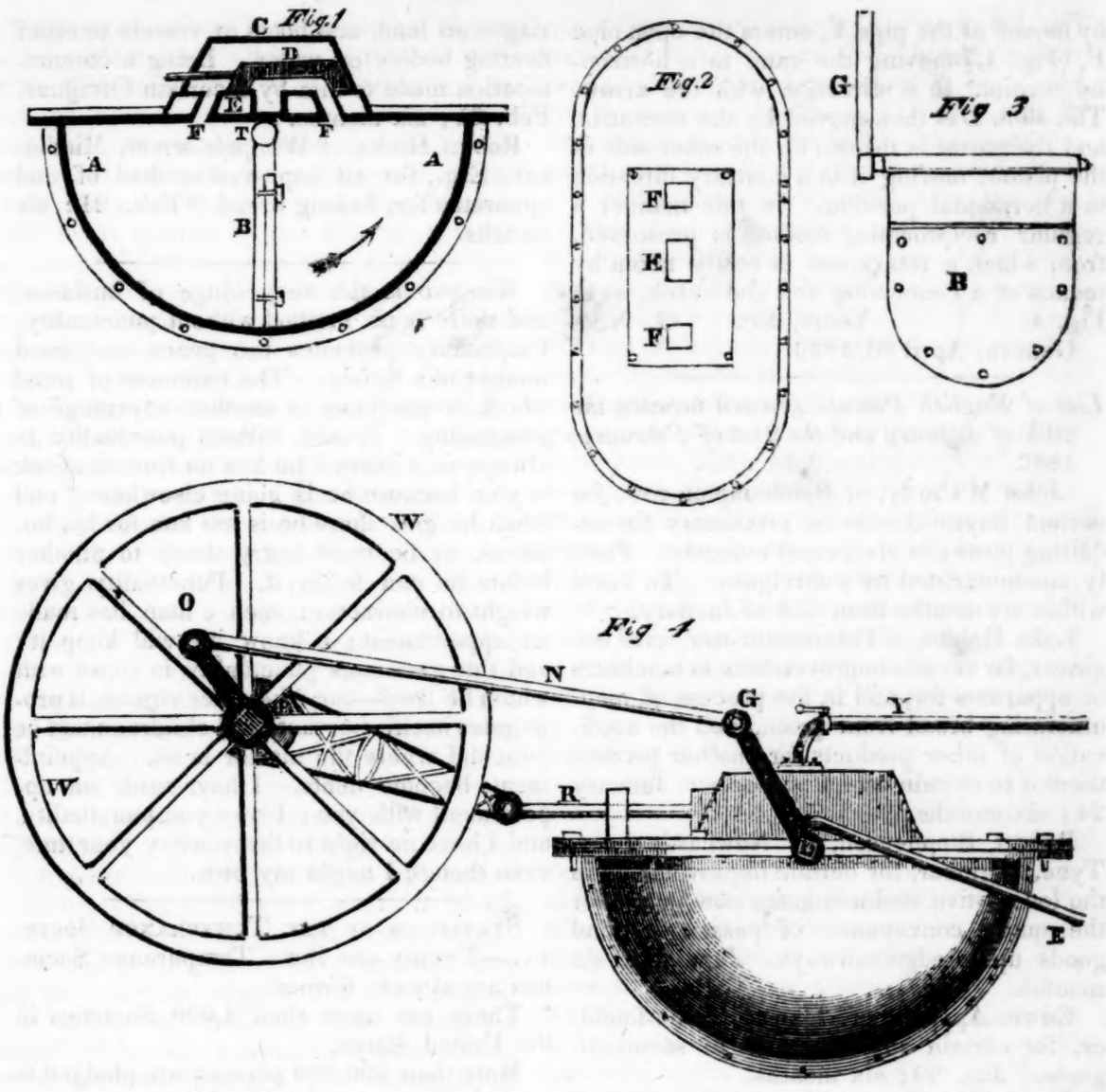
Again, because the bow of a ship is oblique downwards as well as sideways, the water, when she moves, is constantly tending to lift the bow; hence, when a vessel is dragged by a low horizontal rope, as in the case of a boat attached to a sailing ship's stern, or is moved by paddle-wheels, like steamboats, the bow rises much out of the water, and the stern sinks in the hollow or furrow of the track: but when she is driven by sails, as these are high on the mast, and are acting therefore on a long lever to depress the bow, the two opposing tendencies just balance each other, and the vessel sails evenly along.

The form of the fore part of a ship has less influence upon her speed of sailing, than the form of the hind part from the middle to the stern, called the *run*. When a ship is at rest, there is of course as much forward pressure of water about the stern as of backward pressure on the bow; but when she sails, she is running away from the propelling pressure, and is increasing the resisting pressure. A gradual tapering of the hind part therefore, or a *fine run*, as it is called, which allows the water to apply itself readily to it, as it passes along, must quicken much the rate of sailing. A tree, or the tapering mast of a ship, can be drawn through the water the most easily with the large end foremost.

Improved Rotary Engine. By G. N. To the Editor of the Mechanics' Magazine.

Sir,—In your last number I noticed a description of Ericsson's Rotary Engine, extracted from the London Mechanics' Magazine, the chief recommendation of which is its extreme compactness combined with its power. Hitherto Rotary Engines have met with poor success, and this has in a great measure been owing to the great friction which is necessary for preserving the piston tight, or, a want of surface for the steam to act upon. In a reciprocating engine, the constant distribution of power for moving the valves, and geering, necessary to communicate a reciprocating to a rotary motion, must amount to considerable. Now in Rotany Engines all this is avoided, and motion may be communicated to machinery without the slightest difficulty. Judging from the description, Ericsson's Engine has, however, one disadvantage, and that is the difficulty of construction.

Nothing is more requisite for the good performance of any machinery than simplicity and harmony in all its parts, and, the more simple the machine, the better is it made, and consequently the more successful. I give below a description of an Engine in-



vented, I believe, by a Mr. Mollery, of Oswego, which is even more compact than Ericsson's, and much more simple and easy to construct. The only one which I have ever seen was used for propelling a small boat called the "Water Witch," about the size of a common canal boat. She had two engines, one to each wheel, and these were of such dimensions that a man might easily carry one in each hand. And yet it worked rapidly and easy, moving the boat with considerable velocity—say, 10 miles an hour. The whole machinery occupied about a third of the boat.

EXPLANATION.

Fig. 1 represents a longitudinal section through the middle of the chamber A A. B is a piston or vane, moving on the axis T, packed in the usual manner. D, a slide moving in the steam box C. F F are pipes or holes for throwing the steam on the piston. E, the aperture for the exhaust.

Fig. 2 is a top view of the cap to the chamber, having the steam box taken off. F F, holes communicating with the interior of the chamber. E, exhaust hole.

Fig. 3 is a detached view of the piston; G is a bar for giving motion to the crank.

Fig. 4 is a side view of the engine, with all its parts. G is the bar meeting the rod N, which joins the crank at O. P is an eccentric for moving the slide. R, rod for the slide. E, exhaust pipe. Y, pipe for conveying steam from the boiler. W, balance wheel for equalizing the motion. The chamber being in two parts, is screwed together by nuts as shown in Fig. 4. It remains then only to show the manner of setting it to work. This is effected in the following manner—steam being admitted to the steam box

by means of the pipe Y, enters the open pipe F, (Fig. 1,) moving the vane to a horizontal position, in a direction with the arrow. The slide D is then moved by the eccentric, and the steam is thrown on the other side of the piston, moving it in a contrary direction to a horizontal position. In this manner a regular reciprocating motion is preserved, from which a rotary one is easily taken by means of a connecting rod and crank, as in Fig. 4. Yours, &c. G. N.

Geneva, April 3d, 1833.

List of English Patents granted between the 20th of January and the 21st of February, 1833.

John M'Curdy, of Southampton-row, for certain improvements in machinery for acquiring power in rivers and currents. Partly communicated by a foreigner. To enrol within six months from 22d of January.

Luke Hebert, of Paternoster-row, civil engineer, for certain improvements in machines or apparatus for, and in the process of, manufacturing bread from grain, and the application of other products for another product thereof to certain useful purposes. January 24; six months.

Robert Stephenson, of Newcastle-upon-Tyne, engineer, for certain improvements in the locomotive steam-engines now in use for the quick conveyance of passengers and goods upon edge-railways. Jan. 26; six months.

Edwin Appleby, of Doncaster, iron-founder, for certain improvements in steam-engines. Jan. 29; six months.

Josiah John Guest, of Dowlais Iron Works, Merthyr Tidvil, Esq., for an improvement in the process used for reducing iron ore, and other materials containing iron, to what is called in the iron trade finers. Jan. 31; four months.

Luke Hebert, of Hampstead-road, civil engineer, and James Don, of No. 9 Lower James-street, Golden-square, for certain improvements in engines, and other machinery employed in the construction of steam-vessels and steam-carriages, a portion of which improvements is applicable to other purposes. Part of which improvement was communicated by a foreigner. Feb. 21; six months.

Alexander Gordon, of the Strand, engineer, for certain improvements in the boilers or generators of steam or vapor, and in condensing such steam or vapor, and in engines to be worked by steam or vapor for propelling or actuating machinery and carriages on land, and boats or vessels or other floating bodies on water. Being a communication made to him by a certain foreigner. Feb. 21; six months.

Robert Hicks, of Wimpole-street, Middlesex, Esq., for an improved method of, and apparatus for, baking bread. Feb. 21; six months.

Method is the very hinge of business, and there is no method without punctuality. Punctuality promotes the peace and good temper of a family. The calmness of mind which it produces is another advantage of punctuality. A man without punctuality is always in a hurry: he has no time to speak to you, because he is going elsewhere; and when he gets there he is too late for his business, or he must hurry away to another before he can finish it. Punctuality gives weight to character: such a man has made an appointment; I know he will keep it: and this generates punctuality in those with whom he lives—for, like other virtues, it propagates itself. Servants and children must be punctual where the master is so. Appointments become debts. I have made an appointment with you; I owe you punctuality, and I have no right to throw away your time, even though I might my own.

Statistics of the Temperance Society.—Twenty-one State Temperance Societies are already formed.

There are more than 4,000 Societies in the United States.

More than 500,000 persons are pledged to total abstinence, and 1,500,000 practise it.

There are more than 600 vessels sailing out of our ports without ardent spirits.

More than 1,400 distilleries have been stopped.

Two hundred public houses have discontinued selling intoxicating liquor.

More than 4,000 merchants have given up the traffic in ardent spirits.

More than 45,000 drunkards have reformed.

There were in the United States 467,000 regular drunkards in the year 1828.

There were 15,000 persons excommunicated, annually, from the 12,000 churches in the United States, for intemperance.

There were in our cities and large towns about one grog-shop to every twelve families.

There are about 609 murders committed yearly in the United States that proceed directly from intemperance.

TWINKLING OF THE FIXED STARS.—Having never yet seen any solution of the twinkling of the fixed stars, with which I could rest satisfied,* I shall offer the following, which may not perhaps be found an inadequate cause of that appearance; at least it has undoubtedly some share in producing it, especially in the smaller stars. It is not, I think, unreasonable to suppose that a single particle of light is sufficient to make a sensible impression upon the organs of sight. Upon this supposition, a very few particles of light, arriving at the eye in a second of time, will be sufficient to make an object visible, perhaps not more than three or four; for though the impression may be considered as momentary, yet the perception, occasioned by it, is of a much longer duration—this sufficiently appears from the well known experiment of a lighted body whirled round in a circle, which needs not make many revolutions in a second to appear as one continued ring of fire. Hence, then, it is not improbable that the number of the particles of light, which enter the eye in a second of time, even from Sirius himself, may not exceed three or four thousand; and from stars of the second magnitude, they may therefore not much exceed an hundred. Now, the apparent increase and diminution of the light which we observe in the twinkling of the stars, seems to be repeated at not very unequal intervals, perhaps about four or five times in a second: why may we not then suppose that the inequalities, which will naturally arise from the chance of the rays coming sometimes a little denser and sometimes a little rarer, in so small a number of them, as must fall upon the eye in the fourth or fifth part of a second, may be sufficient to account for this appearance? An addition of two or three particles of light, or perhaps of a single one upon twenty, especially if there be an equal deficiency out of the next twenty, would, I suppose, be very sensible; this seems at least probable from the very great difference in the appearance of stars, whose light is much less different than, I imagine, people are in general aware of; the light of the middlemost stars in the tail of the Great Bear does not, I think, exceed the light of the very small star next to it, in a greater proportion than that of about sixteen or twenty to one; and Bouger tells us in his *Traite d'Optique*, that he finds a difference in the light of objects of one part in sixty-six sufficiently distinguishable.

It will perhaps be objected, that the rays coming from Sirius are too numerous to admit of a sufficient inequality arising from the common effect of chance, so frequently as would be necessary to produce this effect, whatever might happen in respect to the smaller stars; but till we know what inequality is necessary to produce this effect, we can only guess at it either one way or the other; there is, however, another circumstance, that seems to concur in the twinkling of the stars, besides their brightness, and this is a change of color. Now the red and blue rays being very much fewer, I apprehend, than those of the intermediate color, and therefore much more liable to inequality from the common effect of chance, may help very much to account for this phenomenon, a small excess or defect in either of these making a very sensible difference in the color.

It will now naturally be asked, why the frequency of the changes of brightness should not be often much greater, as well as sometimes less, than that above-mentioned, and why the interval of the fourth or fifth, or some such part, should be pitched upon, rather than the fortieth or fiftieth part of a second, or than a whole second, &c.; for, according to the length or shortness of the time assumed, the changes that will naturally occur from the effect of chance will be smaller or greater in proportion to each other. The answer to this question will, I think, tend to render the above solution more probable, as well as to throw a good deal of light upon the whole subject. The lengths of the times then between the changes of brightness, if I am not mistaken, depend upon the duration of the perception before-mentioned, occasioned by the impression of the light upon the eye, than which they seem to be neither much longer nor shorter. Whatever inequalities fall within a much shorter time than the continuance of this perception, will necessarily be blended together, and have no effect, but as they compose a part of the whole mass; but those inequalities, which fall in such a manner as that they may be assigned to intervals nearly equal to, or something greater than, the continuance of this perception, will be so divided by the imagination, which will naturally

* Some astronomers have lately adopted, as a solution of this appearance, the extreme minuteness of the apparent diameters of the fixed stars, which, they suppose, must in consequence of this be intercepted by every little mote that floats in the air; but, that an object should be able to intercept a star from us, it must be large enough to exceed the apparent diameter of the pupil of the eye; so that, if the star were a mathematical point, it must still be equal in size to the pupil of the eye.

follow, and pick them out as they arise.—[Phil. Trans. 1767.]

Rice Paper.—The fine and beautiful tissue brought from China and Calcutta, and employed under the name of *rice paper*, is far from being an artificial substance fabricated from rice or any other farinaceous material. By holding a specimen of it between the eye and a clear light, it will be seen to consist of a vegetable tissue, composed of cellules so exactly similar, and so perfect, that no preparation of a paper could be possibly made to acquire.

It is now known to be made of the internal part of the *Œschynomene paludosa*, Roxburg,—a leguminous plant which grows abundantly on the marshy plains of Bengal, and on the borders of vast lakes between Calcutta and Hurdwart. It is a hardy plant, requiring much moisture for its perfect growth and duration. The stem rarely exceeds two inches in diameter, spreading extensively, but not rising to any great height.

The stems of this plant are brought in great quantities in Chinese junks, from the island of Formosa and other places, to China and Calcutta. These stems are cut into the lengths intended for the leaves or sheets, and then, by means of a very sharp and well tempered knife, about ten inches long and three inches wide, the pith is divided into thin circular plates, which, being pressed, furnish the leaves sold under the name of rice paper. The operation of cutting the leaves is very similar to that of cutting corks. The leaves are generally seven or eight inches long and five wide; some are even a foot long. Those which are not fit for drawing are colored for other purposes. Rice paper absorbs water, and swells so as to present an elevation, which continues after it becomes dry, and gives to the drawing a velvety appearance and a relief, which no other kind of paper produces.

Rice paper may, with care, be written upon, as the ink does not spread. The writing is glossy, showing some metallic surfaces.

Examined chemically, it seems to be analogous to the substance which Dr. John calls medulline. Treated with nitric acid, it forms oxalic acid.

The white and pure specimens are much used for drawings; the inferior are variously colored, and now extensively used in forming artificial flowers. In India, a pasteboard is made by cementing many leaves together, and of this hats are fabricated, which, covered with silk or other stuff, are firm and extremely light.

Rice paper was introduced into Europe about thirty years ago. The flowers which were first made of it sold at an exorbitant price. A single bouquet cost the Princess Charlotte of Wales £70 sterling.

From the quality of this paper, it may be most successfully employed in painting butterflies, flowers, birds, plants, and animals. For this purpose, the object is first sketched on common paper, which is then to be pasted on a card. The sketch must be of a deep black. On this the rice paper is fastened, and the painting effected with a pencil and fine colors. When executed in this way, by the most skilful hands, the pictures of butterflies, insects, &c. have been often mistaken for the animal itself pasted on paper. Rice paper has also been employed in lithography, with the most brilliant effect.

It is desirable for the purposes of art, that some aquatic plant should be found in our own climate whose pith is analogous to that of the Œschynomene. Is it not possible, also, to fabricate a paper, the tissue of which may absorb water, and furnish the relief which gives to rice paper its greatest value?—[Jour. des Connais. Usuelles, Fev. 1832.]

Night and Day Telegraphs in France.—A project has been laid before the Government by a Company (Messrs. Ferrier and Co.,) for improving telegraphic communications to such an extent, that they will be able to transmit intelligence an immense distance at any moment of the night or day. This plan is especially calculated for the conveyance of commercial intelligence. A million of francs will be sufficient, according to the Company's calculation, to establish a full complement of telegraphs between Paris and the following places:—Havre, Calais, Lille, Maubeuge, Marseilles, Toulouse, Bordeaux, and Nantes. The yearly expense they calculate at 900,000 francs, but the produce per annum would be 2,803,203 francs.—[London Times.]

Stocking Knitter.—The Lancaster, Pa. Miscellany notices the invention of Mr. McMullen, of Huntingdon county, in that state, of a machine of the above name. It is described as being turned by a crank, and requiring about as much power as a small hand organ. It is capable of performing

the work of six expert knitters, and adapted to the knitting of wool, cotton or silk.

Heat and Light.—Innumerable operations of nature proceed as regularly and as effectually in the absence of light as when it is present. The want of that sense which it is designed to affect in the animal economy in no degree impairs the other powers of the body, nor in man does such a defect interfere in any way with the faculties of the mind. Light is, so to speak, an article rather of luxury than of positive necessity. Nature supplies it, therefore, not in an unlimited abundance, nor at all times and places, but rather with that thrift and economy which she is wont to observe in dispensing the objects of our pleasures, compared to those which are necessary to our being. But heat, on the contrary, she has yielded in the most unbounded plenteousness. Heat is every where present. Every object that exists contains it in quantity without known limit. The most inert and rude masses are pregnant with it. Whatever we see, hear, smell, taste or feel, is full of it. To its influence is due that endless variety of forms which are spread over and beautify the surface of the globe. Land, water, air, could not for a single instance exist as they do, in its absence; all would suddenly fall into one rude formless mass—solid and impenetrable. The air of heaven, hardening into a crust, would envelope the globe, and crush within an everlasting tomb all that it contains. Heat is the parent and the nurse of the endless beauties of organization; the mineral, the vegetable, the animal kingdom are its offspring. Every natural structure is either immediately produced by its agency, maintained by its influence, or intimately dependent on it. Withdraw heat, and instantly all life, motion, form, and beauty, will cease to exist, and it may be literally said, "Chaos has come again."

Clothing, Natural and Artificial.—The covering of wool and feathers, which nature has provided for the inferior classes of animals, has a property of conducting heat very imperfectly; and hence it has the effect of keeping the body cool in hot weather, and warm in cold weather. The heat which is produced by powers provided in the animal economy within the body, has a tendency, when in a cold atmosphere, to escape faster than it is generated; the covering being a non-conductor, intercepts it, and keeps it confined. Man is endowed with faculties which enable him to fabricate for himself covering similar to that with which nature has provided other animals. Clothes are generally composed of some light non-conducting substances, which protect the body from the inclement heat or cold of the external air. In summer, clothing keeps the body cool, and in winter warm. Woollen substances are worse conductors than those composed of cotton or linen. A flannel shirt more effectually intercepts heat than a linen or a cotton one; and whether in warm or in cold climates, attains the end of clothing more effectually.

If several pieces of cloth, of the same size and quality, but of different colors, black, blue, green, yellow, and white, be thrown on the surface of snow in clear daylight, but especially in sunshine, it will be found that the black cloth will quickly melt the snow beneath it, and sink downwards. The blue will do the same, but less rapidly; the green still less so; the yellow slightly; and the white not at all. We see, therefore, that the warmth or coolness of clothing depends as well on its color as its quality. A white dress, or one of a light color, will always be cooler than one of the same quality of a dark color, and especially so in clear weather, when there is much sunshine. A white and light color reflects heat copiously, and absorbs little, while a black and dark color absorbs copiously and reflects little. From this we see that experience has supplied the place of science in directing the choice of clothing. The use of light colors always prevail in summer, and that of dark colors in winter.

Valuable Material for Walks and Alleys.—A soap-maker not knowing what to do with the black sulphurous residuum of his ley tubs, spread it in a wet state along the alleys of his garden. It soon became stiff and almost impervious to rain; the alleys were always dry; no grass or weeds appeared on it, but the plants within a few inches of it all died. He was delighted with this discovery of the means of enjoying clean and dry walks without any trouble, having only to put a covering of clean sand over the refuse. Having occasion some time after to repave his yard, he used the soft refuse instead of mortar. It soon hardened and cemented the stones so well, that the heaviest carriages occasioned no disadjustment.—[Jour. des Connais. Usuelles.]

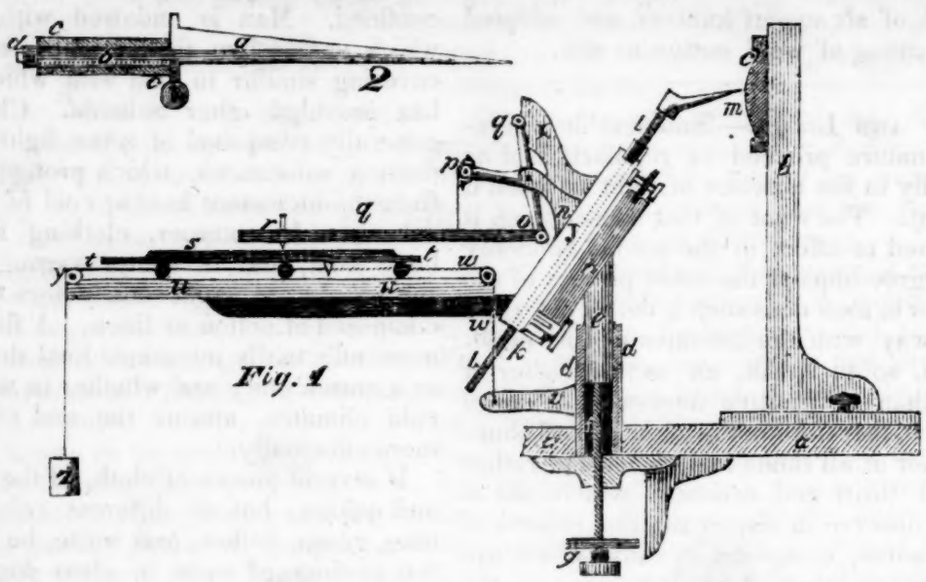


Fig. 1

The above is the engraving promised in our last, of the apparatus "for producing engravings of medals by machinery applied to the surface of the medal itself, or to that of the caste from it;" the description is by Mr. Hebert, Editor of the Register of Arts, and which we copy from the London Mechanics' Magazine. In our Analysis of the December number of that work, we omitted to state that the Editor had done ample justice to the claims America had to the invention, an oversight which we are glad to have an opportunity of rectifying.

"Fig 1—*a a* represents a portion of the table, to which is screwed a standard *b*, that receives the medal *c*, or other subject to be copied. To this table is also fixed a brass socket *d d*, in which a bolt *e*, fitted to it with great accuracy, is made to slide up and down by the agency of a fine threaded screw *f*, provided with a micrometer head at *g*, for the purpose of adjusting the motion through equal spaces. The vertical bolt *e* is surmounted by a strong plate or guide frame *h*, fixed to it in an inclined position; on the upper edge of this frame is a groove, in which run two or more rollers, or little conical edged wheels (as that seen at *i*), fixed to the under side of the upper part of a carriage *j*: this carriage has another roller at bottom, marked *k*, which runs upon a flat plate bolted to *h*. This carriage, made of brass, has a flat steel plate *l l* passed through it, with conical edges moving against anti-friction rollers, and to the upper edge of the steel plate is fixed the tracing point *m*, as will be hereafter more particularly described. *n* is a standard fixed to the tracer carriage, bearing a three-armed piece *o p q*; the lower extremity of the arm *o* being jointed to a bar, which carries the etching point *r* over the copper or steel plate *s*, lying on its carriage *t t*, running upon a metallic stage *u u*. *v* is a metallic arm fixed to the socket *d*, and connected by a steel chain *w w* to a stud *x* in the under side of the plate carriage; to this stud is also attached a silken cord passing over a pully at *y*, suspending the weight *z*: the province of this weight is to draw the carriage plate backwards, as the tracing point passes over the projections of the medal, while the chain *w* draws the carriage forward as the tracing point passes into the cavities. In cases where the descent into cavities is perpendicular, or nearly so, to the plane of the middle, neither the common conical point, nor the tapering blade *m*, will reach the required spot; to obviate this difficulty, the patentee has inserted a very ingenious tracer of the blade form (fig. 2) —*a* is the blade, having an axis *b*, with the centre of motion coincident with one straight edge of the blade, *c c c c* represent a socket, into which the pivot *b* of the blade fits with great accuracy, but made to turn with facility; the nut *d* keeps the tracer up to its bearing, to prevent its shaking longitudinally. It is evident that this form of tracer will admit of its being passed down the perpendicular sides of any declivity, in whatever direction the perpendicular side may be."

The Journal of the Franklin Institute, for September last, contains an elegant engraved portrait of William Congreve, the Dramatist, executed by Mr. A. Spencer, of Philadelphia, in the manner described, and has

inserted the following proofs that the invention can be claimed for America.

"Believing that the credit of the invention of a machine for medal ruling is due to America, we will briefly set forth our proofs, and then speak of the improvements which of late years the method has undergone.

"The proofs to be given of the existence and state of a machine are to be derived from the results produced by it.

"In 1817, by the use of a machine which had been invented in Philadelphia, Christian Gobrecht, die-sinker, produced upon copper an engraving from a medal, having upon it the head of Alexander of Russia: from this engraving impressions were taken and distributed. One of these impressions we have seen.

"In 1819, Asa Spencer (now of the firm of Draper, Underwood & Co. bank note engravers,) took with him to London a machine of the kind above alluded to, which was designed principally for straight and waved line ruling. This machine was used in London during the year just mentioned, and the mode of ruling waved lines, and of *copying medals*, was then exhibited and explained by Mr. Spencer to several artists; particularly to Mr. Turrell, who took, by permission, a drawing of the machine, for the purpose of having one made for his own use.

"Little, however, was done in the way of medal ruling until about three years since, when a desire to apply the method to the engravings of designs for bank notes caused it to be revived by Mr. Spencer, who bestowed great attention upon it, and overcame the difficulties met with in the outset.

"The peculiar construction of this machine has never been made a secret, nor has it ever been patented, although prudential motives have required that it should not be minutely described, and thus be placed in the hands of those by whom its use might be perverted. In consequence of this free communication in relation to this machine, it is now made, with modifications in the details, for engravers, by some of our machinists. We have lately had the pleasure of inspecting one of beautiful workmanship, made by Messrs. Tyler, Fletcher & Co.

"The operations performed by this machine are the ruling of parallel straight lines at any required distances apart, and either continuous or broken; ruling converging straight lines; ruling waved lines, the waves being either similar or varying by more or less imperceptible gradations; and medal ruling, or transferring to copper the fac-simile of a medal without injuring its surface, the waved lines presenting a copy of the minutest parts of the medal.

"Mr. Bate is said, in the extract which we have given, to be engaged in *perfecting* a machine for medal ruling: in his patent he claims the improvements on a machine for that purpose. It is impossible to say how far this latter claim may be borne out, since a description of the patented improvements has not yet reached us.

"That Mr. Spencer has essentially *perfected* this machine, as far as beauty of execution and fidelity of representation in the work to be done by it are concerned, we do not hesitate to say; and that the public here, and our brethren of England, may be enabled to judge for themselves, we have obtained from Mr. Spencer a specimen* of medal ruling executed with his machine, an impression from which we give.

"The engraving is made from a copper medal placed in an embossed card of the ordinary kind. The surface of the medal bears not the slightest trace of injury from the machine, and even the yielding surface of the card is not roughened by it.

"An impression taken thus from a plate gives but a faint idea of the exquisite effect produced by engravings themselves made by this machine upon a polished surface of gold or silver.

"A series of the Napoleon medals, together with a portion of the series of medals struck in commemoration of the events of the first French revolution, attest the skill of Mr. Spencer."

The Journal of the Franklin Institute observes truly, that

"America *has been* without her journals to put forth the claims of her ingenious men, and the credit of more than one invention has passed from her to those who have been able to give greater publicity to their designs; but this day has passed away, and we find notices of the ingenious works of our countrymen transferred to the pages of foreign journals, to be appreciated and acknowledged abroad as well as at home."

That need be no longer a cause of complaint, our pages are open to all communications that have utility for their object, and we invite communications from inventors and

* "Various specimens of this work have been long since sent to London, and may be found in the possession of Messrs. Perkins and Heath, and of other artists."

practical men on all subjects relative to the Arts and Sciences.

History of Chemistry.—Chemistry, considered as an art, is of the earliest origin; but, considered as a *science*, it may be said to be of very modern date. The method of kindling *fires*, baking *bread*, moulding *clays* into various forms, extracting *metals* from their *ores*, and working them into different shapes, as well as several other chemical processes, were certainly known to the Antediluvians.

Tubal Cain, who is mentioned in Scripture, and whom the Pagans made their Vulcan, is the first person on record who knew any thing of this art.

It is said, "he was a worker in Iron and Brass:" he must, therefore, have known something of Chemistry before he could have extracted metals from their ores, and rendered them malleable.

It appears that, soon after the Deluge, the family of *Ham* made great progress in the Art: for the Egyptians, whose country is called Ham in Scripture, and who are said to be the descendants of *Ham*, applied themselves very much to this branch of study, and made many discoveries; such as embalming the bodies of the *dead*, making *Vases*, fabricating a kind of Nitre, making common Salt, and even *Wine;* and, it is said, they knew the art of distillation.

It was in Egypt that the famous Hermes Trismegistus lived, who has been regarded by many heathen nations as the inventor of *all* the arts. He is said to be the Author of all the learning of the Egyptians, and believed by many to have been Chanaan, son of Ham, or Abraham, or Joseph.

From this person the science of Chemistry derived the name of the *Hermetical Art;* a name which it was long known by, and is often called so in old books.

It was in Egypt that Moses learned the properties of Metals, the method of extracting Oils, the preparation of Gums and Perfumes, the solution of Gold, the dying of Linen, the art of Gilding, the making of Pottery, Soap, &c.

The Phœnicians were the first who applied themselves to the examination of the chemical effects of different bodies upon each other; and it is said the Grecians derived their arts which depend on chemical principles from the Phœnicians.

The Romans being mostly engaged in war, were not distinguished among the ancient nations for discoveries in the arts, or inventors in science. They, however, understood the art of making excellent *Wines* and *Spirits*, and knew the application of manures; and the remains of their works of Architecture evince the incomparable perfection of their cement.

But all the *Arts*, *Sciences*, and *Literature*, of the Greeks and Romans, were destined to sink into *oblivion*. Hosts of barbarian conquerors descended upon them from the North, and completely destroyed the principles of civilization, and gave a death-blow both to science and literature.

Driven as it were from Europe, the arts obtained an asylum among the Arabians. The attachment of this nation to magic, and their predilection for the marvellous, soon increased the mysteries in which the arts were then involved; hence Alchymy, or the art of transmuting the various metals into gold, took its rise. This happened about the beginning of the fourth century. As this delusive dream of the imagination held out a bait to avarice, it soon acquired a very numerous train of followers.

Those who professed this *Art* gradually assumed the form of a Sect, under the name of Alchymists: a term which is supposed to be merely the word Chemist with the Arabian article *al* prefixed.

The Alchymists laid it down as a first principle, that all metals are composed of the same ingredients; or, that the principles (at least) which compose gold *exist* in all *metals*, and were capable of being brought to a perfect state by purification.

The substance which possessed this wonderful property, they called *lapis philosophorum*, or the "Philosopher's Stone;" and many of them boasted that they were in possession of that grand instrument.

The fortunate few who were acquainted with the philosopher's stone, called themselves *adepti*, or adepts; that is, persons who had got possession of the secret.

This secret they pretended they were not at liberty to disclose, and that vengeance would fall on the man's head who should *venture* to publish it.

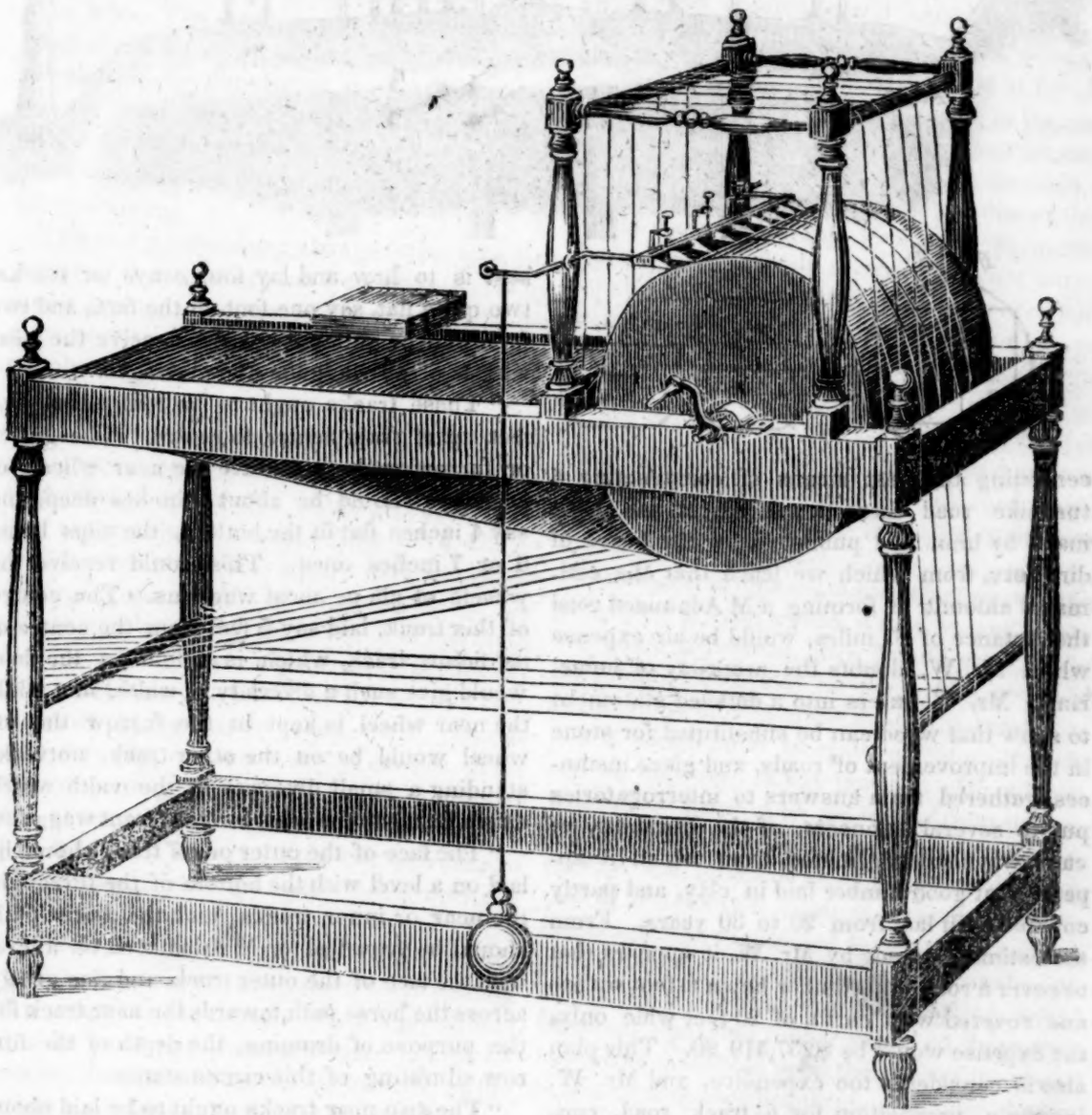
In consequence of these notions, the Alchymists kept themselves as private as possible; and concealed with the greatest care their *opinions*, their knowledge, and their pursuits.

The Alchymists seem to have been established in the West of Europe as early as the ninth century.

Between the *eleventh* and *fifteenth centuries*, Alchymy was in its most *flourishing* state. The writers who appeared during that period were very numerous; but their books are altogether unintelligible, and bear a strong resemblance to the reveries of madmen than the sober investigations of philosophers.

The principal Alchymists who flourished during the dark ages were Albertus Magnus, Roger Bacon, Raymond Lully, and the two Isaacs of Holland. It was against this sect that Erasmus directed his well known satire, entitled the Alchymist.

[*To be continued.*]



Mr. Bigelow's Paper Ruling Machine.—The above cut represents a very simple and compact machine for ruling paper for account books, invented and constructed by Mr. Bigelow, of Fulton street, Brooklyn, L. I., requiring but one person to work it. The paper is laid on by the left hand, and the crank turned by the right, and by means of an endless cloth is drawn towards the cylinder, and confined to it by endless cords. On the top of the cylinder are the pens, which, by means of the weight attached, can be made to press light or heavy, as may be required. The paper thus ruled passes round the cylinder, and by means of the endless cords is conveyed to a sufficient distance to enable the ink to dry when it drops on the pile.

Mr. Jno. S. Williams, Engineer and Superintendant of the Cincinnati, Columbus, and Wooster Turnpike Company, some time since undertook (gratuitously) to survey the route from Goshen to Columbus, with a view of as-

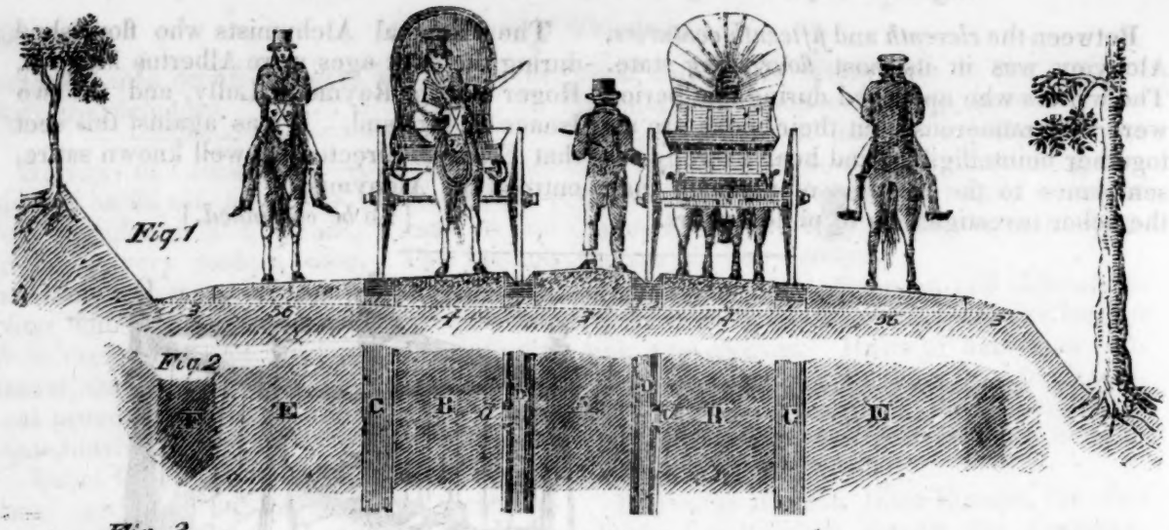
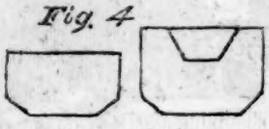


Fig. 3

Fig. 4



certaining the best means of constructing a turnpike road thereon. A report has been made by him, and published by the board of directors, from which we learn that the estimated amount of forming a M'Adamized road the distance of 81 miles, would be an expense which Mr. W. doubts the propriety of incurring. Mr. W. enters into a detailed statement to show that wood can be substituted for stone in the improvement of roads, and gives instances, gathered from answers to interrogatories put to several engineers, of the durability of causeways so constructed, from which it appears that good timber laid in clay, and partly covered, will last from 20 to 30 years. From the estimates made by Mr. W. it appears that to cover a road with timber hewn a foot square and covered with earth, of 20 feet wide only, the expense would be $257,419 80. This plan also is considered too expensive, and Mr. W. inserts a proposition for a track road, constructed of timber (see plate), the advantages of which he thus describes:

"It becomes necessary to inquire in what way timber, which is so plenty, and appears to last well, can be disposed of to our advantage. My reflections upon this subject have brought me to believe that timber hewn flat and laid in ways or tracks lengthwise of the road, to bear the pressure of wheels, would insure the end desired. The method that I believe to be the best is to hew and lay four ways or tracks, two quite flat, say one foot on the face, and two furrowed or guttered so as to receive the near wheels of all waggons and carriages.

"These tracks ought to be laid about five feet apart from centre to centre. The gutter or furrow made to receive the near wheels of carriages should be about 3 inches deep, and say 4 inches flat in the bottom, the tops being 6 or 7 inches open. This would receive the wheels of all or most waggons. The centre of this track, laid say 5 feet from the centre of its fellow track, which is a foot on the face, would give such a diversity of width, that while the near wheel is kept in the furrow the off wheel would be on the other track, notwithstanding a small diversity in the width which exists between the wheels of different waggons.

"The face of the outer or off track should be laid on a level with the bottom of the furrow in the near or inner tracks, and the horse path should be gravelled or M'Adamized on a level with the face of the outer track, and rise gently across the horse path towards the near track for the purpose of draining, the depth of the furrow admitting of this circumstance.

"The two near tracks ought to be laid about four feet apart, from centre to centre, and gravelled or M'Adamized between them, for what I shall call the driver's path. This path would accommodate footmen, horsemen, and teamsters, or, if thought best, a horseman's path may be constructed on each side of the outer or off tracks. Four feet for the driver's path, and five feet each for the horse paths, together with six inches on each side for the surplus width of the outer tracks, make a total width

of fifteen feet from out to out of the two carriage ways; eight and a half feet on each side would be the width of summer road and ditch in a 33 feet graduation.

"For the purpose of draining, these tracks should be inclined not less than half a degree. In fact, no part of any M'Adamized road ought to be less. The near or guttered tracks might be changed for a few inches at the foot of the slopes from the guttered to the flat form without any inconvenience to the travel: this would form a side drain across the horse-paths. The outer tracks being flat would present no obstacle to draining.

"By carriages keeping always to the right, the power of this kind of road I conceive would be much greater than that of common roads, for more carriages could operate upon them without obstruction or danger, than if allowed to run promiscuously.

"As respects the ease of travelling, a road thus constructed being perfectly smooth and sidewise level, I conceive it would be superlative. It is observable, in the travelling of M'Adamized or other roads, that a great difficulty exists in keeping the wheels of waggons out of the ruts or furrows that wear, or accident has made in the road. There seems to be a propensity or habit in horses to follow each other, and consequently to run in the same track. In this order they are the most easily driven. This very propensity or habit of horses is a drawback of twenty per cent. upon the permanence of M'Adamized covers. It is our privilege, if not our duty, to turn if possible this propensity to our advantage: thus, in such a road as the one under consideration, little or no trouble would be necessary to keep the wheels steadily and regularly in the tracks. When snow would cover the road and thereby render the tracks obscure, the chances would be in favor of the road being frozen so as to bear in any part, and render the keeping of the tracks unnecessary.

"In case a carriage of speed should overtake one of burthen, it will be easy for it to mount over the driver's path and run in the left hand track until an opportunity appears for it to resume its proper one: the driver's path being raised but three inches.

"As to the lastingness of timber thus situated, I am of opinion it would be good. The earth or clay would completely envelope every stick its whole length, except the upper surface, by which its native juices would be completely extracted, particularly if the timber be large enough to cut through the heart. As to the capability of wood to sustain the travel for a great length of time, my experience in this particular is too limited to assert positively, but from what observations I have been able to make, I am of opinion that it would compare better with broken stone than might at first be imagined. The sides of the furrows in the near tracks would suffer abuse; but when we consider that they would be three inches thick at the top, and four at the bottom, and that as they would wear they would give more room, and thereby be less likely to wear, it is not unreasonable to conclude that good timber well laid, under an ordinary travel, would last on an average of fifteen years. The near tracks might not last more than ten, while the outer or off tracks would last twenty. There being little or no jolting, or even jarring, the great source of wear in common roads, the track-road would out-last all others, respect being had to the materials of construction.

"In regard to the cost of constructing, and the perpetuity of such a road, it may be well to observe that at present, on a great portion of the line, timber sufficient for the tracks abounds within 30 to 50 feet of the centre; a great portion of which must be removed before the line can be improved in any manner. On no part will timber have to be moved far from its native to its destined locality, and as regards perpetuity, the prospect is more favorable than that of M'Adamized roads in a country where lime-stone, the material of construction and repair, is barely sufficient for other branches of improvement, during this and coming ages. Good oak and other timber can at all times and forever be cultivated upon the sides of the road, rendering it at once beautiful, pleasantly shady, and perpetual: advantages by no means attending M'Adamized roads, which will forever continue to exhaust the present existing material without there being a possibility of a renewal. This would in future prove to be a serious disadvantage in districts of country but scantily supplied at present.

"The horse paths, the driver's path, and the summer roads, might be improved by laying upon them a coat of gravelly earth, which abounds in many parts of the country destitute of stone, and can be procured and laid at a very small cost.

"Gravelly earth will present an even and pleasant road to travel, if the weight of loaded wheels can be kept from it, as is witnessed on the tow-paths of our canals, where constructed of that material. But I would suggest that the horse and driver's paths be M'Adamized to the depth of six inches, which would be amply sufficient for any purposes for which it is intended: under this might be laid, say, six inches of gravelly earth, whenever it shall be found convenient. It might also be proper to gravel, say, five feet of each summer road, or at least construct the upper surface of them of the most solid earth in the neighborhood. The tracks may be laid of timber, round except the upper surface. It would, however, be better to form them of large, well grown timber, split or cut through the heart: the sides squared, so as to take off the bark and white-wood. These tracks may be of pieces any convenient length, with the ends brought to a determinate thickness, and laid upon a block placed to receive them. The under side of the tracks ought to be straightened or partly flattened, in order to secure a more steady position of them. The earth ought to be closely applied to the bottom and sides, not only to effect this object, but to secure a more speedy extraction of the acid from the wood. The limey quality transferred from M'Adamized horse and driver's paths to the wooden tracks, would be likely to prevent both wear and decay. Where the road is necessarily much curved, it ought to be M'Adamized, and the tracks dispensed with, particularly if good material is convenient, which is almost invariably the case, where your line is crooked. The line from Goshen to Columbus, as will be seen by the map, is laid almost entirely of long straight lines, not more than one mile and eighty-two poles requiring to be M'Adamized, and that where the stone is most plenty. Eighty miles of the line, therefore, is suitable for tracks, which ought first to be laid of squared timber, fter which the two inner ones might be gutter-r furrowed by machinery propelled by steam mal power, and moved along the tracks eously as the operation proceeds.

oposed method of improvement, if er the purposes of traffic and tra- shall last equal to the expecta- r or not, will be found to be ty, by reason of the cheap- astruction, which brings the first cost of improvements, to a level with the scanty means of a country newly settled, and as it were yet in the wilderness."

Mr. Williams advocates, with much earnestness, internal improvements of every description: the report is well drawn up, and is of itself evidence that it has been done by a hand well acquainted with the subject upon which it treats. We think, however, that in speaking of the probable advantages to be derived from systems that he recommends, he is rather too sanguine of the result. We cannot do better than let Mr. W. speak for himself:

"Any state or nation that would adopt a general system of internal improvement by roads and canals would do away sectional jealousy. The interests of the different parts would become one by the common course of intercommunication. Inter-marriages would take place, and a general diffusion of acquaintanceship, and a union of interest would be the result. At the same time that wealth, the source of power, would be thus increased, power itself would follow its consequence of the system. The means of intercourse would give a facility to the transportation of men to defend the country, and stores to render those men comfortable; munitions of war, too, would reach every point to render formidable those forces, which with the greatest facility could be conveyed so as to render the effective force double to what the same means would be without it. This system would at once unite the citizens as if they inhabited but a small island, while at the same time they would be as strong as if they filled a vast territory."

Such a state of things is very desirable, and perhaps may occur, but we think it not likely in our time. Mr. W. concludes the report thus:

"The hand which guides this pen was among the first to fell the trees of the interminable territorial forest, to let the sun see the soil that now in the state of Ohio presents so many pleasing subjects for contemplation and reflection."

Affording another instance that, in a free country like this, industry and talent will always be duly appreciated, and in most cases amply rewarded.

[Since the above was in type we have received a communication from Mr. Williams, by which we learn that the Company have determined to construct eight miles of road on this plan.—Ed. Mec. Mag.]

Analysis of Scientific Periodicals for March.

The American Journal of Science and Arts. January, February, and March, (Quarterly.) New-Haven, H. Howe & Co.—This is a rich number. The article on Mr. Babbage's Economy of Machinery and Manufactures, (a very neat edition of this work has been recently published by Carey & Lea, Philadelphia,) displays great judgment. It will be read with interest by every lover of science, and the practical man will derive from it much useful information. It is, in fact, an epitome of Mr. Babbage's book, interspersed with numerous judicious remarks by the writer.

Mr. Thomson's description of *curves in arches*, with engravings, we purpose transferring to our columns in our next.

Mr. Phillips' article on the Georgia Gold Mines, (with numerous illustrations,) is full of interest, and, in truth, the whole number will bear comparison with any of the European journals. In mechanical execution, it surpasses many of them.

The Journal of the Franklin Institute contains short accounts of thirty-six American patent inventions, none of which are of much interest. Among them are five of patent medicines. With all due deference to the committee, we would suggest whether such matters had not better be left to the Medical Journal.

Under the signature of *Modern Antiques*, the claim of Mr. T. O. N. Ruthers, (in a communication to the Philosophical Magazine,) to the invention of a new *Oxy-Hydrogen Blow Pipe Apparatus*, is disputed. It is stated that the merit appears to be due to Dr. Hone, and an account of it was published in the same Journal 15 years ago.

The Repertory of Arts and Inventions, (London,) contains an account of a patent machine or motive power, for giving motion to machinery of different descriptions, to be called Hainsselm's Motive Power, principally by water, which we shall give in our next, with such of the engravings as may be necessary to illustrate the description. It cannot but be of great utility in this country, where so many opportunities present themselves of applying water power.

Mr. William Henry James, civil engineer, of Thavies Inn, has obtained a patent for improvements in steam carriages. He has constructed a new boiler, consisting of metal plates so thick as to retain heat, and thin enough to be portable. The plates are perforated in a variety of orifices like malting bricks, and by regular perforations are made to form continued tubes, when the separate sheets or plates of metal are laid together.

Another improvement is in the lantern: three elegant lamps are placed in the very foremost part of the engine, and are fed from reservoirs of portable gas.

Mr. James also claims, in his specification, the novelty of having *the Guard's Horn played by steam*. What next? "We shall," as the editor of the Repertory observes, "have an orchestra filled with steam fiddlers and fifers, and our machines will move to the measures of Mozart, or the wild rythm of Von Weber."

It appears that the engine must be very large, and the machinery very complex, and is one of those inventions which in theory appear very plausible, but are extremely difficult to put into practical operation.

Literary Gazette.—From it we learn that a committee of scientific gentlemen, whose names combine an array of talent, resolved to commemorate the anniversary of the 100th year of the birth of Priestley, by a public dinner, considering him entitled to the distinction, being the founder of Pneumatic Chemistry.

London Mechanics' Magazine.—In the February number, besides the description of Ballingall's improvements on ship building, [which will be found at page 162,] are several articles of interest and ability.

In the review of Mr. Alexander Gordon's "Journal of Elemental Locomotion," the editor attempts to amuse his readers with a description of what he is pleased to call "the Day Dreams of Mr. Gordon." Mr. Gordon, who we know is really a scientific and well informed man, contends for the practicability of applying steam power to travelling on common roads. The editor of the Mechanics' Magazine, on the contrary, says, "the thing is *impossible*—nature and *art* alike forbid it. No one, who is acquainted with the scientific principles on which the application of steam to travelling on common roads must depend for success, and who is free from all sinister interests, can view with the least pleasure or approbation an advocacy conceived in so *ignorant* and so visionary a spirit."

The attack on Dr. Birkbeck is quite as rancorous and as unjustifiable as most of the former ones have been from the same source. They certainly are, as far as the doctor is personally concerned, undeserved. No one has been a greater friend to mechanics' institutions than Dr. Birkbeck, and more especially to the one in London.

METEOROLOGICAL RECORD, KEPT IN THE CITY OF NEW-YORK.

From the 26th day of March to the 29th of April, 1833, inclusive.

[Communicated for the Mechanics' Magazine and Register of Inventions and Improvements.]

Date.	Hours.	Thermometer.	Barometer.	Winds.	Strength of Wind.	Clouds from what direction.	Weather and Remarks.
Tuesday, Mh.26	6 a. m.	36	29.78	WNW—NW	moderate	WSW	fair
	10	42	.85	NW	fresh	..	..
	2 p. m.	45	.86	..	..	..	..
	6	40	.92	..	..		..
	10	36	30.01	..			..
Wednesday, 27	6 a. m.	32	.05	..	moderate		clear
	10	44	.08	..	..		..
	2 p. m.	46	.02	SW			fair—hazy
	6	42	.02	..	..		hazy
	10	40	.01	..	..	SSW	..
Thursday, 28	6 a. m.	30	.10	NW by N	light		..
	10	40	.13	..	..	WSW brisk	..
	2 p. m.	43	.00	SW—NNW	moderate	..	..—cloudy and hazy
	6	41	29.97	N by W	..	..	fair
	10	37	.94	..	..	..	..
Friday, 29	6 a. m.	30	.89	NNW	light	..	..
	10	34	.91	..	..	..	..
	2 p. m.	45	.81	W—NW	moderate	..	..
	6	43	.81	NW	..	..	..
	10	40	.89	..	light	..	..
Saturday, 30	6 a. m.	36	.99	W	..		clear
	10	40	30.05	WNW	fresh		..
	2 p. m.	50	29.98	..	moderate		..
	6	48	30.02	..	..		..
	10	44	.09				..
Sunday, 31	6 a. m.	40	.16	SW	light		..
	10	50	.19	..	..		..
	2 p. m.	60	.09	SW by W	..		..
	6	55	.02	..	..		..
	10	50	.05	..	..		..
Monday, April 1	6 a. m.	43	.08	WSW	light		..
	10	50	.10	SW by W	faint		.. —moderately smoky,
	2 p. m.	66	.06	..	light		.. [or dry fog
	6	60	.02	..	..		..
	10	54	.03	..	faint		..
Tuesday, 2	6 a. m.	45	.10	N—NNE	faint		clear—moderately smoky,
	10	56	.15	NE—ESE	light		.. — .. [dry fog
	2 p. m.	62	.12	ESE—SE by E	..	WSW	fair — ..
	6	56	.10	ESE	..	..	.. — ..
	10	50	.10	E	..	..	.. — ..
Wednesday, 3	6 a. m.	44	.09	NE—E	..	SSW	.. — ..
	10	48	.09	ESE—SSE	..—moderate	..	cloudy — ..
	2 p. m.	57	.01	SSE	moderate	SSW / —— / SSE	..
	6	55	.00	..	..	.. / —— / ..brisk	.. —rain
	10	54	29.91	..	fresh	SSW	rain
Thursday, 4	6 a. m.	52	.75	..	faint	..	cloudy and foggy—rainy
	10	56	.72	SSE—SW	..	SSW—W—SW	cloudy—fair at 1 p. m.
	2 p. m.	64	.72	SW	light	WSW	fair
	6	60	.65	S	..	SSW	..
	10	57	.67	..	..	WSW	..
Friday, 5	6 a. m.	53	.61	W—WNW	moderate	..	.. —light smoke
	10	56	.71	WNW—NW	..-fresh	NW	.. — ..
	2 p. m.	58	.75	NW-NW by W	fresh—mod'te	..	.. — ..
	6	50	.85	NNW	moderate	..	..
	10	47	.90	..	..		clear
Saturday, 6	6 a. m.	43	30.03	NNW—N	light		..
	10	50	.09	N—SW	..		..
	2 p. m.	60	.08	SSW	..		..
	6	55	.05	S by W	..	WSW	fair
	10	49	.10	..	..		..

NEW-YORK.

Date.	Hours.	Thermometer.	Barometer.	Winds.	Strength of Wind.	Clouds from what direction.	Weather and Remarks.
Sunday, April 7	6 a. m.	46	30.18	S by W—SE	light	WSW	fair—light smoke
	10	56	.20	SE	..	..	.. —smoky and hazy
	2 p. m.	55	.18	SE—ESE	mod'te—fresh	WSW / SSE	cloudy
	6	50	.07	ESE	fresh	SSE	..
	10	50	29.98	..	strong	..	.. —rain
Monday, 8	6 a. m.	50	.70	..	light	..	cloudy and foggy
	10	54	.66	SE	..		rainy
	2 p. m.	56	.62	variable	faint	SSW—WSW	fair
	6	59	.60		calm	WSW	..
	10	49	.65		..	..	..
Tuesday, 9	6 a. m.	52	.75	NNW	fresh	SSW / N	fair
	10	56	.81	..	..		clear
	2 p. m.	63	.85	..	..		..
	6	61	.97	..	moderate		..
	10	54	30.01	..	light		..
Wednesday, 10	6 a. m.	48	.08	..	faint		..
	10	53	.11	..	..		..
	2 p. m.	62	.08	WSW—NW	light		..
	6	62	.04	NNW	faint	NNW	fair
	10	54	.05				cloudy
Thursday, 11	6 a. m.	50	.03	NE	light-moder'e	NW	fair
	10	52	.05	ESE	moderate	..	..
	2 p. m.	55	29.95	SE	..	W & NNW / SSW brisk	..
	6	52	.79	SE by E	light	.. / ..	.. —(clouded horizon)
	10	51	.70	..			.. —cloudy
Friday, 12	6 a. m.	51	.50	SSE—S	light	SW	cloudy
	10	58	.47	SSW—SW	faint	SSW	..
	2 p. m.	68	.42	SW & variable	light	SW	fair—changeable
	6	51	.45	NNW	fresh	SSW / NNW	..
	10	53	.56	..	..		cloudy
Saturday, 13	6 a. m.	42	.65	..	moderate	NW	fair
	10	47	.72	..	fresh	..	..
	2 p. m.	47	.72	..	..	..	..
	6	46	.72	..	..	..	..
	10	43	.83	..	..	..	..
Sunday, 14	6 a. m.	42	.94	WSW	moderate		clear
	10	54	30.01	W by S	..		..
	2 p. m.	57	29.89	..	..	W	fair
	6	53	.91	..	..	W by S	..
	10	52	.95	..	..	..	..
Monday, 15	6 a. m.	38	30.25	S	..		..
	10	42	.27	..	..		..
	2 p. m.	47	.28	SSE	..	WSW	..
	6	39	.29	..	..	SW	..
	10	38	.30	..	..	..	..
Tuesday, 16	6 a. m.	38	.29	NE by E	fresh	SW by S / E by N	fair
	10	43	.33	..	..	SW	..
	2 p. m.	58	.27	ENE—E	moderate	..	.. —cloudy
	6	48	.24	E—ENE	..	..	cloudy
	10	46	.20	ENE	..	..	..
Wednesday, 17	6 a. m.	42	.12	..	light	..	..
	10	44	.13	variable	faint	..	..
	2 p. m.	48	.08	..	..	SSW brisk	..
	6	47	.10		..	..	..
	10	46	.13		calm		..
Thursday, 18	6 a. m.	44	.16	WSW	faint	WSW	foggy—fair
	10	51	.21	SSW—S	..—light	..	fair
	2 p. m.	62	.20	S	moderate	WSW / NW	..
	6	56	.18	..	..	WNW	..
	10	53	.24	..	..	..	..
Friday, 19	6 a. m.	48	.36	NE—E—ENE	light		clear
	10	55	.40	SW	..	WSW	fair—thin & elevated *cirri*

NEW-YORK.

Date.	Hours.	Thermometer.	Barometer.	Winds.	Strength of Wind.	Clouds from what direction.	Weather and Remarks.
Friday, April 19	2 p. m.	63	30.38	SW—S	moderate	WSW	fair—thin & elevated *cirri*
	6	56	.29	S	..	..	.. — ..
	10	50	.30		calm		.. — ..
Saturday, 20	6 a. m.	50	.36	SW	light	WSW / W	.. — ..
	10	58	.28	..	moderate	.. / — / ..	.. — ..
	2 p. m.	68	.22	..	..	WSW	.. — ..
	6	64	.15	..	..	..	..
	10	58	.15				..
Sunday, 21	6 a. m.	52	.09	SW	light	..	.. —foggy—fair
	10	62	.09	S	..	..	fair—thin *cirri*, highly eleva-
	2 p. m.	68	29.91	..	moderate	..	.. — .. [ted
	6	62	.85	..	light	..	.. — ..
	10	59	.84	..	..		..
Monday, 22	6 a. m.	54	.89	NW	moderate		clear
	10	60	.94	NNW	...	WNW	fair
	2 p. m.	68	.94	N—NE—ENE	light	..	..
	6	61	.94	ESE	..		clear
	10	57	.96		..		fair
Tuesday, 23	6 a. m.	52	.87	E	moderate	SW / E	} cloudy—rainy—at 8 a. m. } barometer 29.90)
	10	54	.82	SE—S	..	SW	cloudy—fair
	2 p. m.	64	.70	SW—ENE	..	SW and WSW	fair—cloudy
	6	62	.60	ENE	..	WSW	cloudy
	10	57	.73	..	..—gale	..	cloud'd horizon-gale in night
Wednesday, 24	6 a. m.	43	.95	NE	fresh	NE—(scuds)	cloudy and rainy
	10	44	30.07	N by E		..	..
	2 p. m.	44	.10	..	moderate	WSW / NE	..
	6	45	.14	..	..	.. / — / ..	fair—upper haze from WSW
	10	44	.17		..		..
Thursday, 25	6 a. m.	43	.20	WSW	..	W by S	..
	10	48	.24	WSW—SW	light	W by S / SSW	.. — } light *cirrus* clouds } from WSW
	2 p. m.	58	.20	S	moderate	W by S—WSW	.. —cloudy
	6	52	.19	S—SW	..	WSW to NW	cloudy—fair
	10	48	.19	SW	..	WNW	fair
Friday, 26	6 a. m.	45	.18	WSW—NNE	light		clear
	10	52	.23	N	moderate		..
	2 p. m.	58	.23	..	..		..
	6	58	.23	N by E	light		fair—at 7 low bank of clouds
	10	50	.27		..		.. [at W
Saturday, 27	6 a. m.	43	.37	ENE	..	N by E	..
	10	50	.40	SSW	..—moderate	N by E / SSW	..
	2 p. m.	58	.37	S	moderate	NNW	.. —light haze from NNW
	6	53	.33	..	..	..	.. — ..
	10	48	.35	..	..	..	.. — ..
Sunday, 28	6 a. m.	48	.31	SW	..	..	.. — ..
	10	47	.30	..	..	..	.. — ..
	2 p. m.	68	.21	SW by W	..	..	.. — ..
	6	64	.18	..	..	..	.. — ..
	10	60	.18	..	light		..
Monday, 29	6 a. m.	56	.11	..	moderate		clear—light smoke
	10	65	.13		..		.. — ..
	2 p. m.	77	.07		..		.. — ..
	6	73	.01	..	..		..
	10	69	.04	..	..		..

Average temperature of the week ending April 1st, 43.77.—Do. of the week ending April 8th, 53.22.—Do. of the week ending April 13th, 51.51.—Do. of the week ending April 22d, 53.62.—Do. of the week ending April 29th, 54.

Maximum of the barometer in March, on the 14th, 30.52—Minimun on the 25th, 29.57.—Range 0.95 inch.

The winds for the month of March were Northeasterly, including North, during 29¼ periods of observation; Southeasterly, including E, 21; Southwesterly, including S, 49¼; and Northwesterly, including W, 47.

The observations of the highest atmospheric currents, as indicated by the clouds during March, are as follows:—from the Northeastern quarter, 4; from the Southeastern, 4; from the Southwestern, 53; and from the Northwestern, 25.